GAS

FEBRUARY 1958

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THE NATION'S NATURAL GAS AUTHORITY

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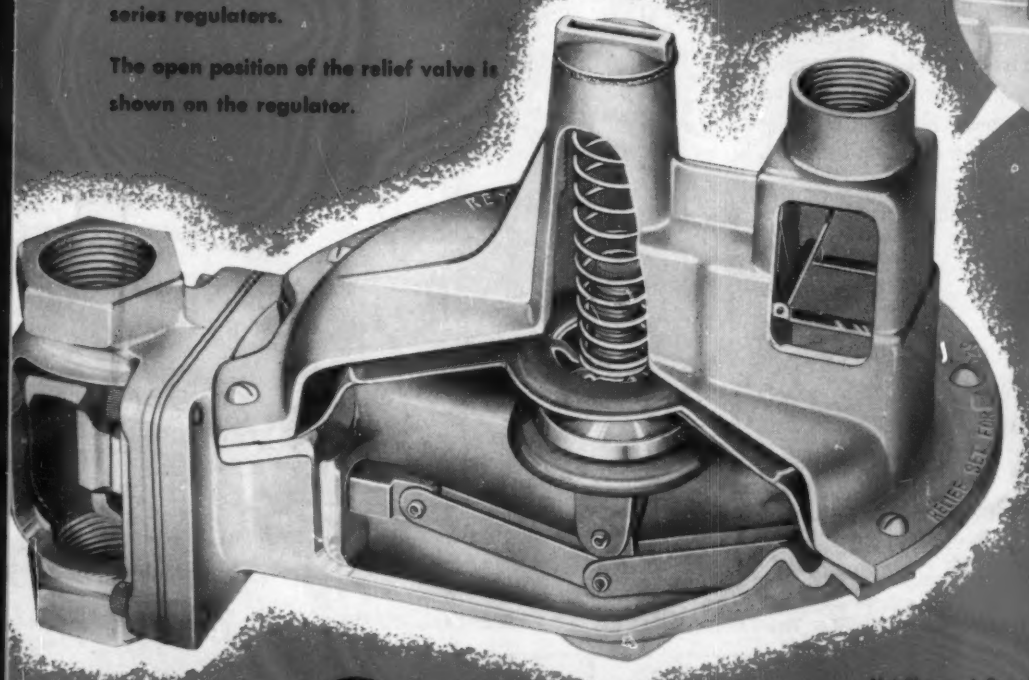
INTERNAL RELIEF VALVE

Reynolds new full capacity relief valve is inter-changeable for older model regulators.

It is standard equipment on all "EI" series regulators.

The open position of the relief valve is shown on the regulator.

Closed Position . . . . .



This new Reynolds relief valve has a double action sealing effect which permits the use of a large relief valve orifice which still seals and relieves within close regulation.

An Automatic quick opening flapper for excess pressure gas and yet has standard small vent opening for normal regulation.

The all stainless steel construction flapper valve eliminates high shock-lock off common to other type regulators.

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Not Shown—A Complete Line of Outside Vent Projection

GAS CONTROL SINCE 1892

WRITE FOR DETAILED INFORMATION

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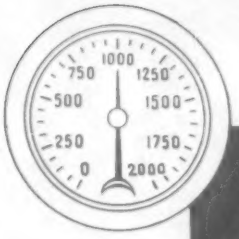

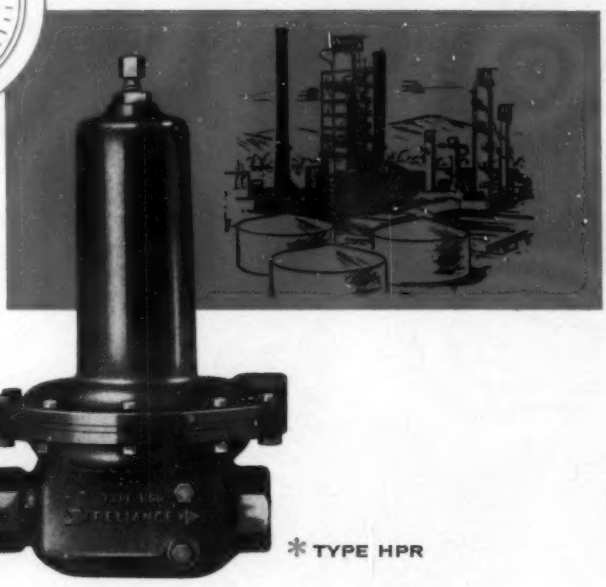

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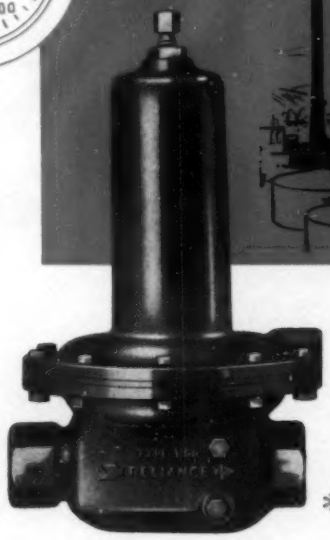

*TYPE HPR

Silent Masters OF HIGH PRESSURE GAS

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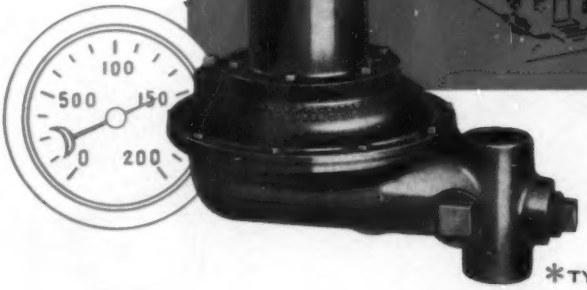

*TYPE HPH

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CONTENTS

February 1958

34TH YEAR OF PUBLICATION

VOLUME THIRTY-FOUR • NUMBER 2

▪ FEATURES

Is your LPG storage safe? 49
By Herbert F. Jewson

Repair sealing bell and spigot joints with rubber base sealants 59

Confident industry will continue record expansion 62
By Robert W. Otto

$5 billion appliance market predicted for 1958 65
By Clifford V. Coons

Therm billing becomes routine with punched card system ... 66
By Cecil V. Griffith

Success of all-gas village prompts new promotion 72

Modern kitchen isn't only place for eye-appealing built-ins. 74

What a serviceman should know about low voltage heating controls 75
By Robert L. Farmer

▪ PIPELINE SECTION

New desert station boosts Cal-Counties 'import' supply.... 113
By James Joseph

The future possibilities of gas chromatography 119
By Walter J. Podbielniak and Seaton T. Preston

▪ DEPARTMENTS

Editorial comment—

Thermally Thinking, *by J. Fred Ebdon* ... 6
Highlights 8
Regulatory and Legislative Trends 11
Technical Trends, *by Guy Corfield* 15
Washington, *by Neil Regeimbal* ... 17
Corrosion Prevention, *by Marshall E. Parker* 19
Communications, *by Frank Chapman* .. 135

News Developments—

Union Gas of Canada acquires new properties 90
Northern Illinois trims more from heating list 91
Industry feeling impact of court's Memphis decision 132
Am-La's C-D rate denied again 137
Columbia moving into exploration field 143

Departments—

Associations 81
People 82
Digest of New Products and Trade Literature. 98
Calendar 104
Pipeline People 129
Advertisers Index 144

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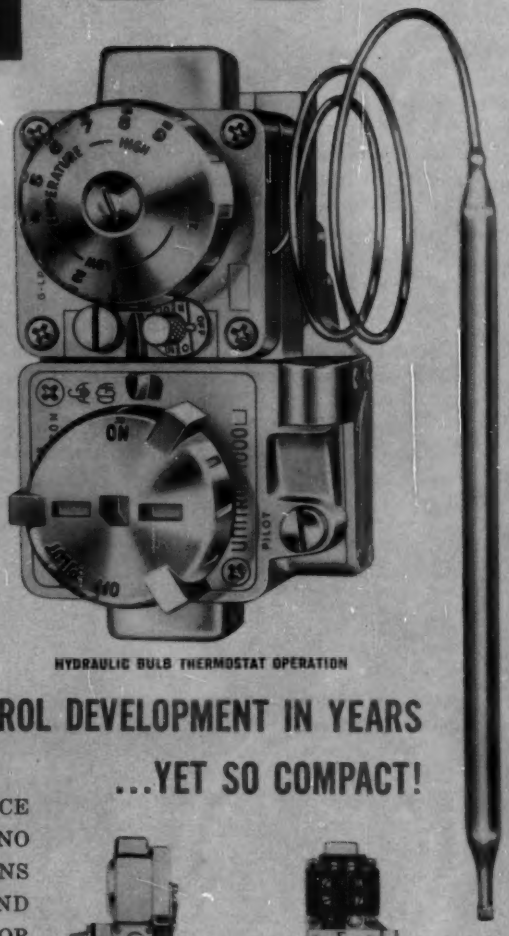

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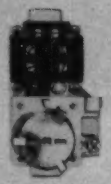

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GAS

FEBRUARY 1958

Thermally Thinking

OUR industry grew into real strength under the Natural Gas Act of 1938, as amended. Particularly spectacular development was experienced after World War II. Business was good all over during this period, but perhaps not as good as in the gas industry where, for example, Tennessee Gas Transmission Co. was able to grow from organization in 1944 to become an over-$1-billion organization just 12 years later.

From 1938 to 1954, the FPC did not assume jurisdiction over independent gas producers. But in 1954, the Phillips Petroleum decision was handed down by a Supreme Court that directed FPC to ignore provisions of the Natural Gas Act which stated it did not apply "to the production or gathering of natural gas."

During 1955, Panhandle Eastern got a rate increase in which the FPC allowed the company to charge itself a price, for gas it produced, based on the fair field concept. The Court of Appeals for the District of Columbia overturned this ruling and said that this integrated gas company should use the cost-rate base concept. Later, another integrated gas company, Colorado Interstate, tried to base rate increases on the fair field price only to have an FPC examiner reject it in a ruling that would bankrupt the company, according to Colorado Interstate's president, W. E. Mueller.

As was the case with the Phillips Petroleum decision, which wiped out a precedent stretching from 1938 to 1954, the more recent Memphis-United Gas decision invalidated rate-making procedure covering the period from 1938 to Nov 21, 1957.

Since Memphis, a pipeline company must have agreement from involved customers before it can raise its rates. And over 50 rate increases (involving some 30-odd companies) that were suspended, but put into effect subject to refund, may have to be actually refunded. Without a doubt this would be a very serious matter for most of the involved pipeline companies and it is said that it would put some out of business.

A gas industry floundering around under such rulings and regulation will not be much of an asset to this nation's economy and strength. And no single segment of the industry is going to make much progress without equal development of the other two.

It is very likely that the following things will happen sometime before 1960:

1. Some of the ramifications of the Phillips decision will be cured;

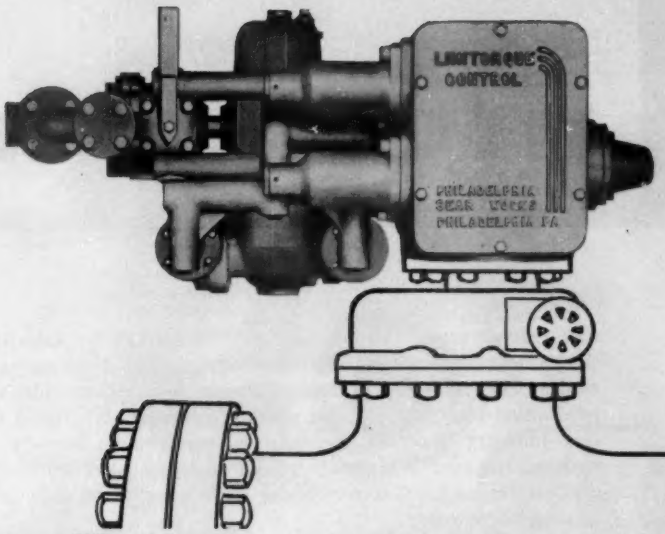
2. The findings in the Panhandle matter will be overruled; and

3. The Memphis decision will be reversed.

But the first action is to lay these matters in wide-open form before the Congress and the people. If the gas companies of our industry don't take the lead in this, one wonders who—if anyone—will.

J. Fred Ebsen

EDITOR



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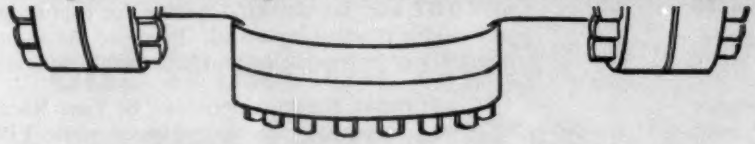

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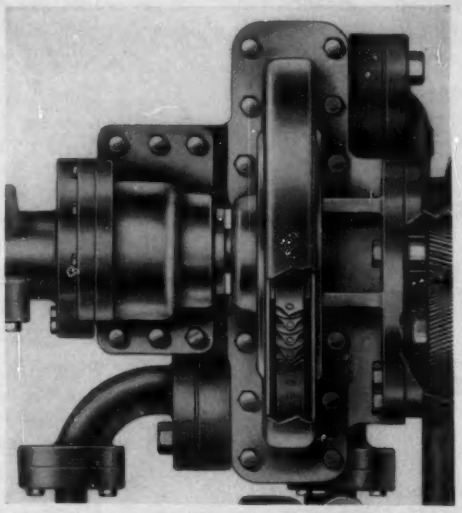

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GAS HIGHLIGHTS

Gas refrigerators on market in April

Gas refrigerators will be back on the market by mid-April. Whirlpool Corp., new owner of Servel's gas refrigerator division, says it will start making the gas boxes at Evansville, Ind. soon. Debt-ridden Servel stopped production last August; sold out last month to Whirlpool for $6.5 million. Gas industry leaders, shedding no tears over Servel's departure, are enthusiastic over Whirlpool's pledge to spend $450,000 annually on refrigeration research. Gas companies have guaranteed sale of 150,000 boxes in next three years.

FPC plans appeal to Congress

FPC will appeal to Congress as well as Supreme Court to throw out the Memphis decision. Commission chief Kuykendall says he hopes high court will rule on appeal before end of current term. He also says FPC will not feel bound by lower court ruling until Supreme Court acts.

TGT plans big spending in '58

Another big year ahead for Tennessee Gas. President Gardiner Symonds says TGT may lay out $150 million for capital expenditures in '58, $129 million for pipeline expansion. Proposed '58 construction will boost average daily system capacity by 282 MMcf to 2.26 billion.

FPC defies Memphis decision in EP case

FPC has defied Memphis decision. El Paso Natural has been allowed to collect higher rates from 28 customers while FPC investigates proposal. But, El Paso must post bond for higher rates, totaling $16.5 million.

Appliance makers see bigger year

Gas appliance makers expect bigger dollar volume increases this year. Unit sales, though, might not increase much over 1957. Reason for more dollars: trend toward top quality heating systems, water heaters, ranges.

Houston-Coastal will roll by April 1

Construction kickoff date for oft-postponed Houston-Coastal pipeline is now set for early spring. Coastal spokesman says it will be rolling by April 1. Financing plans are now in final stages.

Four companies will test plastic meters

Plastic gas meters will debut this year. Four companies, Houston Natural, Long Island Lighting, Southern California and Southern Counties, will test them.

Big market seen for gas main pipe

Distribution companies will use 661 million ft of pipe between 1957 and 1975, U. S. Department of Commerce predicts. Figure doesn't include pipe for transmission, irrigation, or service lines.

Pioneer will acquire Empire Southern

Pioneer Natural Gas Co. (Amarillo, Texas) will take over Empire Southern Gas Co. (Fort Worth). If stockholders approve, Empire Southern will dissolve, adding its 25,000 customers to Pioneer's system. Voting is set for this month on stock transfer, no-cash deal.

ALG buys pipeline construction firm

Arkansas Louisiana Gas Co. continues diversifying. Newest subsidiary (third in year): Pitts & Bryant Co. Inc., pipeline contractors. Firm will retain name. Headquarters will move from Lafayette, La. to Little Rock, Ark., ALG's home.

Lone Star Producing builds new plant

Natural gas treating plant using hot potash-amine method is being built by Lone Star Producing Co. Located in Fashing field, Atascosa county, Texas, plant will have capacity of 100 MMcf/day. Cost of plant, gathering system and production facilities—$3.75 million.

Laclede will expand big storage field

Laclede Gas Co. (St. Louis) will spend $2.5 million to expand its important Lange underground storage field this year. Included in expansion: additional compression, seven new deep wells.

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Utility commission expertise must not ignore evidence

This is a continuation of the discussion started in January on the rights of utilities and how they were defended by a recent ruling of the West Virginia supreme court.

"Both Blundon and Snyder also testified to the effect that even if the West Virginia consumer could not actually be supplied entirely with West Virginia gas, the West Virginia consumer was entitled to West Virginia gas to satisfy his consumption needs and to the benefit of the cost of gas produced in West Virginia. This testimony is a mere expression of the belief or the desire of these expert witnesses and simply voices their judgment as to the proper decision of that question in this proceeding. * * * It furnishes no facts which could serve as a basis for their conclusion and it would substitute their judgment for that of the commission. It does not support or justify the finding of the commission on that point. Nor does it follow, either in law or in logic, that a consumer of the lower cost West Virginia gas, who needs more West Virginia gas than can be reasonably or practically furnished him by the petitioner, is entitled to an amount of gas produced elsewhere at a higher cost to make up the deficiency between the amount of West Virginia gas which can so be supplied to him and the amount of such gas necessary to satisfy his needs, at the price charged for the lower cost West Virginia gas which cannot be furnished. On the contrary to require the petitioner to furnish this equivalent at a loss of the difference between the lower production cost of West Virginia gas and the higher production cost of gas obtained from another source would constitute confiscation of the property of the petitioner to the extent of the loss thus sustained by it which cannot be recovered from its consumers of gas in other states."

The court gave its opinion on cost allocations where an integrated natural gas system is distributing local and intermingled imported gas. The court stated:

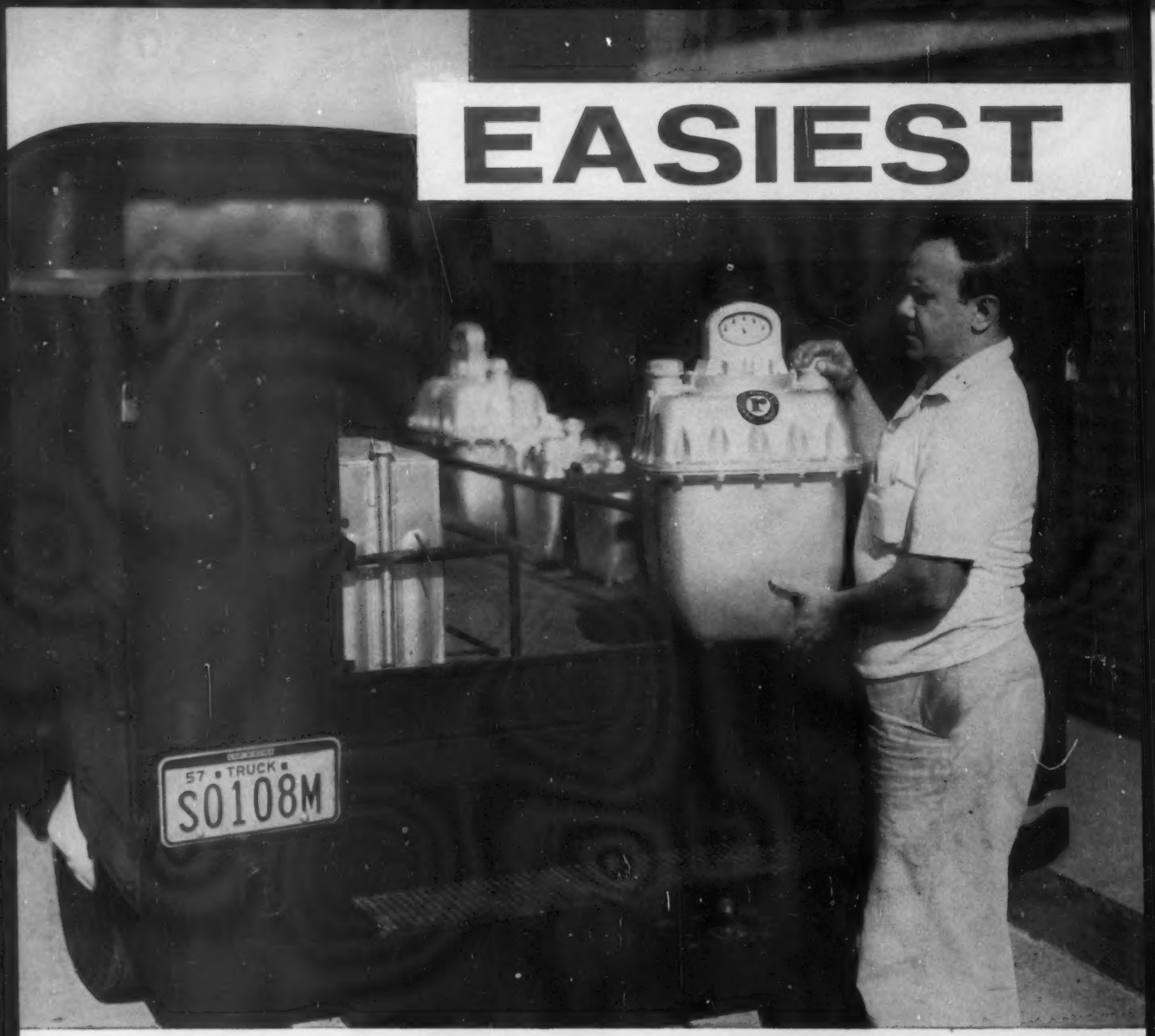
"The petitioner contends that the proper portion of the production and transmission costs incurred by it which should be assigned to its West Virginia consumers and charged to its West Virginia business should be determined on the basis of the ratio between the total costs of the business operated by its entire system and the cost of the deliveries of all the gas furnished to its West Virginia consumers in the operation of its intrastate business in this state during the test period of one year; and in pursuance of that method it classifies the total costs incurred into demand costs and commodity costs.

"It is well recognized that all utilities generally classify their entire expenses in two main categories. One category embraces fixed or demand costs and the other embraces variable or commodity costs. If the cost is incurred solely for the purpose of enabling the utility to meet the peak or maximum requirements of its consumers at any given time or period and does not vary with the volume of sales the cost is a demand cost. If, however, the cost incurred varies directly with and depends upon the volume of sales it is a commodity cost. * * * Application of the method employed by the petitioner, which would allocate the production and transmission costs, the costs of underground storage being considered as a part of the transmission costs, on the basis of the ratio between the total amount of those costs for all the gas delivered by the operation of its entire system and the amount of the costs of all the gas, including gas produced in this state, in Kentucky and gas obtained from the Southwest, sold and delivered to its West Virginia consumers, would assign to them and to its intrastate business in this state between 10 per cent and 11 per cent of the entire amount of its total production and transmission costs, or $8,437,722 of the total production and transmission costs of $78,852,783." * * *

"There is and should be no inflexible rule which requires the application in all cases of either the allocation method or the segregation method. Either method may be properly applied where the facts in any particular case

Continued on page 109

EASIEST



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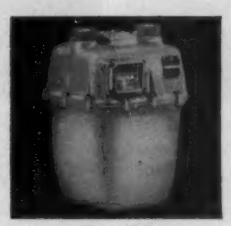

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Model 711 for widely scattered jobs. 45 m.p.h. travel speed. Digs to 5' deep and 18" wide. One-man operation. Hydra-Crowd assures maximum crowding speed for every digging condition.

Model 702 for narrow trenches to 5" wide, 40" deep. Ideal for cable, conduit, or small pipe. Easily moved. Varidraulic drive gives finger-tip control of crowding speed from 0 to 20 ft. per min.

Model 44-C for heavy-duty trenching. It cuts to 8'3" deep, 24" wide. 15 digging speeds from 1 to 11 ft. per min., or available with Hydra-Crowd with infinitely variable speeds from 0 to 7 ft. per min.

Literature on request.

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CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

TECHNICAL TRENDS

By GUY CORFIELD

Lubricating oil additives

In the past few years great advancement has been made in the development and use of additives to lubricating oils. The oil we put in our automobiles, or our gas engines and compressors, is far more complex than the early unprocessed straight run petroleum. It might be more properly advertised as synthetic, rather than "100 per cent pure Pennsylvania." It contains various chemicals which modify or improve the petroleum base. These chemicals have to be selected and blended with great care so that they not only produce the desired result, but also are compatible with the base oil and with each other and do not introduce problems of handling, storing, mixing, etc.

Some of the most important and commonly used additives are as follows:

1. Auto-oxidants or oxidation inhibitors; organic compounds containing sulfur, phosphorus or nitrogen, sometimes combined with tin, zinc or barium; prevent varnish and sludge formation.

2. Corrosion preventatives; somewhat similar to the above anti-oxidants; prevent corrosion of alloy bearings and metal surfaces in general.

3. Detergents; metallo-organic phosphates, sulfonates, and high-molecular weight soaps containing magnesium, barium, calcium and tin; keep metal surfaces clean.

4. Dispersants; metallo-organic naphthenates and sulfonates and organic salts of calcium, cobalt and strontium; keep sludge-forming materials in suspension to prevent deposition.

5. Oil film strength, extreme pressure and anti-wear agents; organic chlorine, sulfur and phosphorus compounds and lead soaps; reduce friction, galling, scoring and general wear.

6. Rust preventatives; sulfonates, amines and fatty oils and acids; prevent rusting during shut-down or storage.

7. Stringiness and tackiness agents; high molecular weight polymers and aluminum soaps of fatty acids; increase adhesiveness of lubricant to metal surfaces.

8. Pour point depressors; polymers of alkylated naphthalene or phenol; reduce temperature at which oil will congeal (solid particles or masses will form).

9. Viscosity index reducers; polymerized olefins or alkylated styrene; to lower the rate of change of viscosity with temperature change.

10. Foam inhibitors; silicone polymers; prevent formation of stable foam.

Some lubricants are more complex than others in the variety and quantity of additives they contain. One of the most complex types are automatic transmission fluids. They require chemical aids for oxidation-corrosion inhibition, detergent action, viscosity index improvement, anti-wear, oil film strength and rust prevention. Furthermore the treated oil must be non-toxic, have no disagreeable odor and no adverse effect on various materials such as both ferrous and non-ferrous metals, several kinds of synthetic rubber and other sealers and gaskets, and clutch and band facing materials.

Water: plentiful but scarce

Fresh water is one of our vital and rapidly diminishing natural resources or, perhaps more properly stated, our consumption of fresh water is rapidly catching up with our available supply. Moreover, our available supply is not in many cases located in the areas of greatest demand, so that serious local shortages are already developing. Actually, water is not "used up" to any great extent in the sense that it is destroyed or converted to something else. It is principally passed through our plants and homes and run to disposal or converted into vapor. For continuing supply we depend on the sun and wind to re-deposit it in rivers and lakes and underground strata, and our usage is approaching the natural replenishment on which we can depend.

This leads, of course, to schemes for conservation. It also is accelerating research on de-salting inland brackish water, or the limitless supply of sea water. If this is done with combustion heat, it will in turn place an additional strain on our fuel resources.

The de-salting of water has been man's dream and effort for centuries, without practical success. Over the past five years our government, through the Office of Saline Water of the Department of the Interior, has spent over $2 million in research, which is beginning to show possibilities. The OSW is interested in any process that gives promise of producing fresh water at $2 per thousand gallons, with the hope that large-scale operation could reduce the cost to 50 cents.

Twenty-one different ideas are being followed, most of which involve the application of fuel for distillation. One of the most unique is the Hickman process in which thin jets of the saline water are sprayed over a rotating heated wheel. The evaporated water is condensed. This assertedly keeps salt deposition to a thin and easily removable film, avoiding the problem of heavy scaling. Several multi-stage evaporative assemblies are being explored.

Solar evaporation is not being neglected. In one scheme the sun, shining through glass or plastic, evaporates water which condenses on, and is run off from, the underside of the transparent plates. Capacity, however, is low. There is also a field in the use of membranes which filter out the salt. Extensive experiment is assertedly being conducted in the Netherlands. Still another idea is based on freezing the water, which produces salt-free ice.

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"What sold you?"

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"So?"

"So I can ship my heating equipment into any part of the country – get service-free operation in any season. Operator fluid won't thin to heat or congeal to cold, like ordinary oil."

"That all?"

"Certainly not. All moving parts are permanently lubricated – sealed out of the gas stream. Gives my units dead-quiet operation."

"Sounds like it costs a little more, but your peace of mind and the reputation of your equipment should be worth it."

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WASHINGTON

By NEIL REGEIMBAL
GAS Washington Bureau

Busy days in court facing gas industry

THE gas industry has entered 1958 with the clouds of federal controls becoming more and more ominous.

Chances are good that the industry, particularly the producers, will spend some busy days of the next few years in court trying to get out from under what they claim are overly burdensome federal regulations.

Gas distributors, too, have an interest in the producer battles, because while the controls will probably tend to keep gas prices down, they also threaten to cut supplies of gas moving in interstate commerce.

The fate of the Harris-O'Hara gas bill should be pretty well determined early in the new session of Congress, probably no later than March. Backers of the bill are anxious to get it to a vote in the House as soon as all the compromises that can be made are settled and all the vote-trading possible is completed.

The House holds the key to the bill, which would ease, but not lift, Federal Power Commission control over independent producers. If it passes the House, the experts believe it will have fairly easy sailing through the Senate.

But the chances that it will pass the House did not appear too good as the lawmakers got back to work in January.

If the bill does pass, it will take some of the pressure off several important court cases. But the industry will still have to fight most of them out.

The FPC has finally finished hearings on the Phillips case—the original gas producers rate case which is 1954 resulted in the U. S. Supreme Court decision bringing all independent producers under federal regulation.

Final briefs in the Phillips case won't be filed until May 5, so a decision on the controversy is still some time away. When it comes, however, it will set several precedents.

Principal issues in the case include the questions of what constitutes a fair return for a producer, what makes up the cost of service and how costs between oil and gas production should be allocated, and finally what rate Phillips should be permitted to charge for its gas to match the first two issues.

While it's not a direct issue in the Phillips case, a recent appeals court decision requiring all customers of a pipeline to approve a request for higher rates before it can be filed will bear on the outcome. Most industry spokesmen agree that if upheld, this lower court decision will make it almost impossible for pipelines and producers to secure increases, and therefore the initial rates approved by the FPC must be high enough to insure an operating profit for some time.

The FPC, as well as the gas industry, has been thrown into a considerable sweat by the decision. Commission Chairman Jerome K. Kuykendall has asked the Solicitor General to appeal the decision to the U. S. Supreme Court.

He calls the decision a threat to consumers as well as the entire gas industry because the financial stability of many firms would be seriously damaged or destroyed, and expansion in the industry will be knocked into a cocked hat.

The same appeals court ordered the FPC to refuse rate filings unless all customers have agreed to them. The order came in a case involving the city of Memphis, Tenn., the Mississippi Valley Gas Co., and United Gas Pipe Line Co.

The appeals court said it based the decision on the so-called Mobile case, in which the U. S. Supreme Court rejected a "unilateral" gas rate increase, not agreed to by two parties involved in a supply contract.

The gas industry was upset about the original Mobile case, but is in a real tizzy about the appeals court decision. It is generally believed that it is too late for a Supreme Court review of the Memphis case this court term. And many gas lawyers in Washington are not sure that there is even a reasonable chance the high court will reverse the decision when it is appealed.

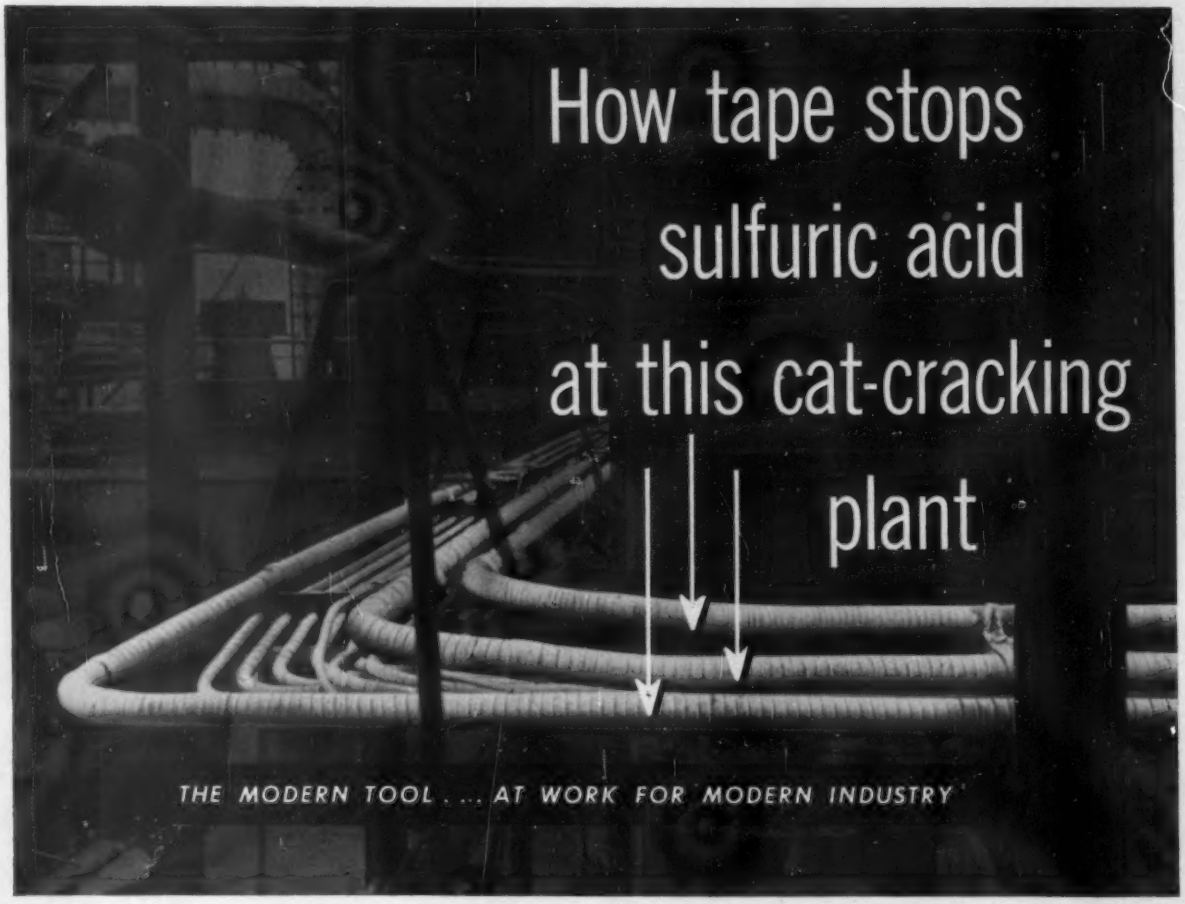
The Court is likely to rule that the appeal court's decision is a logical extension of the Mobile case, one attorney glumly comments.

Some gas industry spokesmen are now talking of legislation in Congress to upset the ruling by amending the Natural Gas Act to write into law existing FPC regulations whereby a supplier files a new tariff and tries to prove that it's reasonable, or asks for a commission review of present rates and tries to prove they are too low.

This legislation, which may be introduced this year, will probably be separated from the Harris-O'Hara gas bill.

At one time, the U. S. Supreme

Continued on page 106



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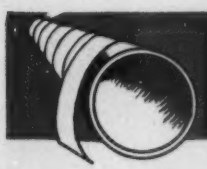


CORRODION PREVENTION

By MARSHALL E. PARKER

Locating underground contacts and open couplings by electrical measurements

By Charles L. Woody, United Gas Corp., Houston

THIS paper presents some very useful techniques for coping with one of the most annoying problems involved in the protection of distribution piping, particularly in mild climates where there is no frost to force the water piping to greater depths than the gas piping. The problem is further complicated by the wide variety of pipe sizes which go to make up a distribution system, by the number of different utilities involved, by the presence of paving, and by continual construction activity.

It is considered essential by the author's company to segregate piping in sections not longer than 5000 ft to 10,000 ft. This is readily done on new construction, but requires additional work on older systems. Test points must be provided, unless service lines are so located as to perform this function.

"Pipe-to-water" potentials—that is, potential differences between the (gas) pipe under study and the water piping in the same area—are found quite useful, both in primary studies and in routine checks on system performance. Anode current measurements are needed; these are made either with a zero-resistance ammeter circuit, or by means of permanently installed shunts in the anode lead. Potential and current readings, as described, may indicate the presence of contacts or of open circuits; the next problem: precise location.

One simple technique, effective in all but complex cases, is the use of a contact-type pipe locator. A signal is put on the line, and points of signal loss are then located; if these can be identified with crossing lines, they represent contacts.

In very congested areas, such as street intersections, recourse may be had to a more sophisticated method. An interrupted current is introduced into the main at a remote point. Three test spans are then investigated, one on either side of the suspected contact, and one which spans the area in question. The central span is considered to be divided, in an unknown ratio, into two sections carrying different currents, by the contact; the ratio of these two sections is calculated and the contact thus located. This technique requires very sensitive instruments and careful work; it is effective in a large number of instances, although it would probably be inapplicable in a (fluctuating) stray current area.

Another method consists of applying a fairly heavy current between the two structures believed to be in contact, and then tracing the current flow on both structures. It is pointed out that the actual values of IR drops on water mains are unreliable, but that dependence must be placed on locating the point of reversal of direction.

Three methods are given for locating open or high - resistance couplings, in ascending order of their simplicity and effectiveness. Where the pipe is readily contacted, a simple potential survey along its length may locate the open joint. A pipe locator may be used, with the joint found by the drop in tone; this test may fail in the case of large flanged joints, or in the case of a joint which is partially conductive. The third method involves the application of a large current to a length of the line, and the careful tracing of IR drops over short spans; a span whose drop is excessive for its length indicates the presence of a resistant joint.

The method of locating broken or severed anode lead wires by means of surface potential surveys is described; the author states that, on occasion, it is even possible to locate the exposed end of the broken wire, since it may be acting as an anode. The same technique may be used to give at least a rough indication of the relative current output of individual anodes in a group.

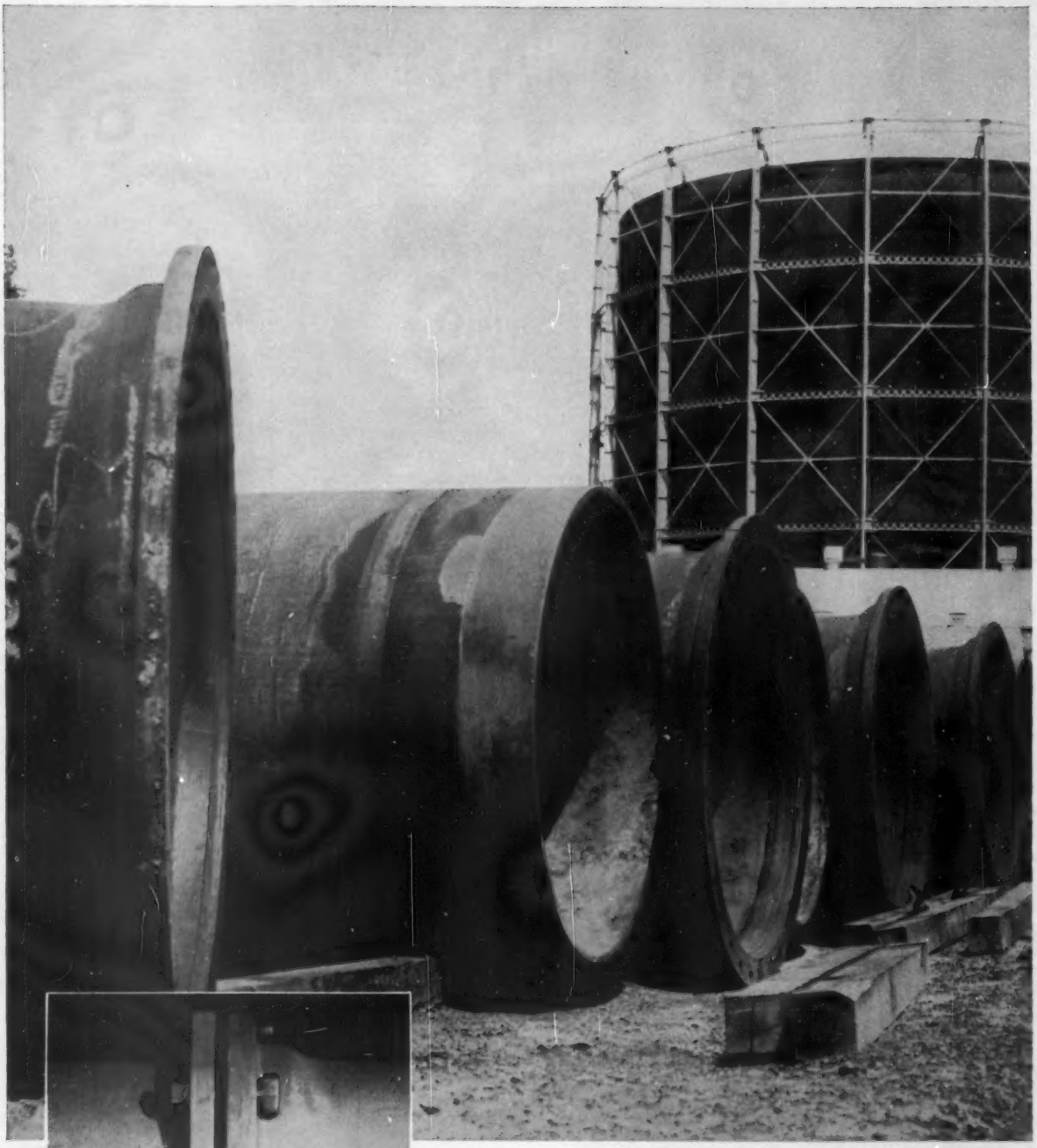
Records related to a natural gas distribution corrosion control program

By Leonard C. Hill, Kansas-Nebraska Natural Gas Co., Inc., Hastings, Neb.

THIS paper presents an excellent description of the way in which well-designed and well-kept records can integrate the corrosion control program into the company's overall operations, thus making the most effective use of field personnel for the major part of the routine checking so essential to the continued operation of protective systems. All new construction since 1944 has been with welded steel pipe, coated and wrapped and cathodically protected as a part of the installation. As a result of this policy, 115 of the company's 169 town distribution systems are completely protected, while all of the others have either spot protection or some protected sections.

Field personnel make monthly checks of the potential differences across a designated set of insulated joints; that is, the water system of the town is used for a reference electrode. In this way an effective check is kept of the performance of the protective systems, and full-scale surveys have to be made only at rare intervals. A follow-up system is used to ensure the completeness of the coverage, and a concise set of note-book records is kept for ready reference and review. The criteria used are two: 1.0 volt to $CuSo_4$ for coated pipe, and 0.3 volt shift in potential for bare pipe.

These articles have been abstracted from papers presented at the NACE South Central Regional Conference held in Oklahoma City in October.



Large diameter Mechanical Joint cast iron pipe to be installed for feeder mains in gas distribution system at Indianapolis, Ind.

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MECHANICAL JOINT cast iron

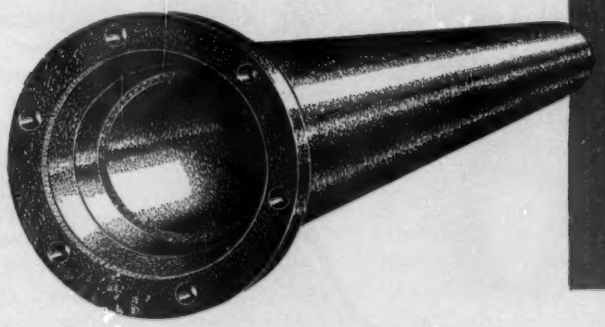
its main job is to serve a century

Cast Iron Pipe's dependability is built in

Buying pipe is a major investment . . . one you naturally want to protect. And you do when you specify cast iron. No other pipe comes even close to matching its performance. Consider: 57 American gas companies are still using cast iron gas mains laid a century and more ago. Hundreds more have passed the fifty year mark of service. That record alone would justify your choice of cast iron. But *modern* cast iron pipe, centrifugally cast, is even tougher, stronger, more serviceable. Cast iron's dependability, long life and long term economy are built in.

A FEW OF THE 57 GAS UTILITIES WITH CENTURY-OLD CAST IRON MAINS IN SERVICE

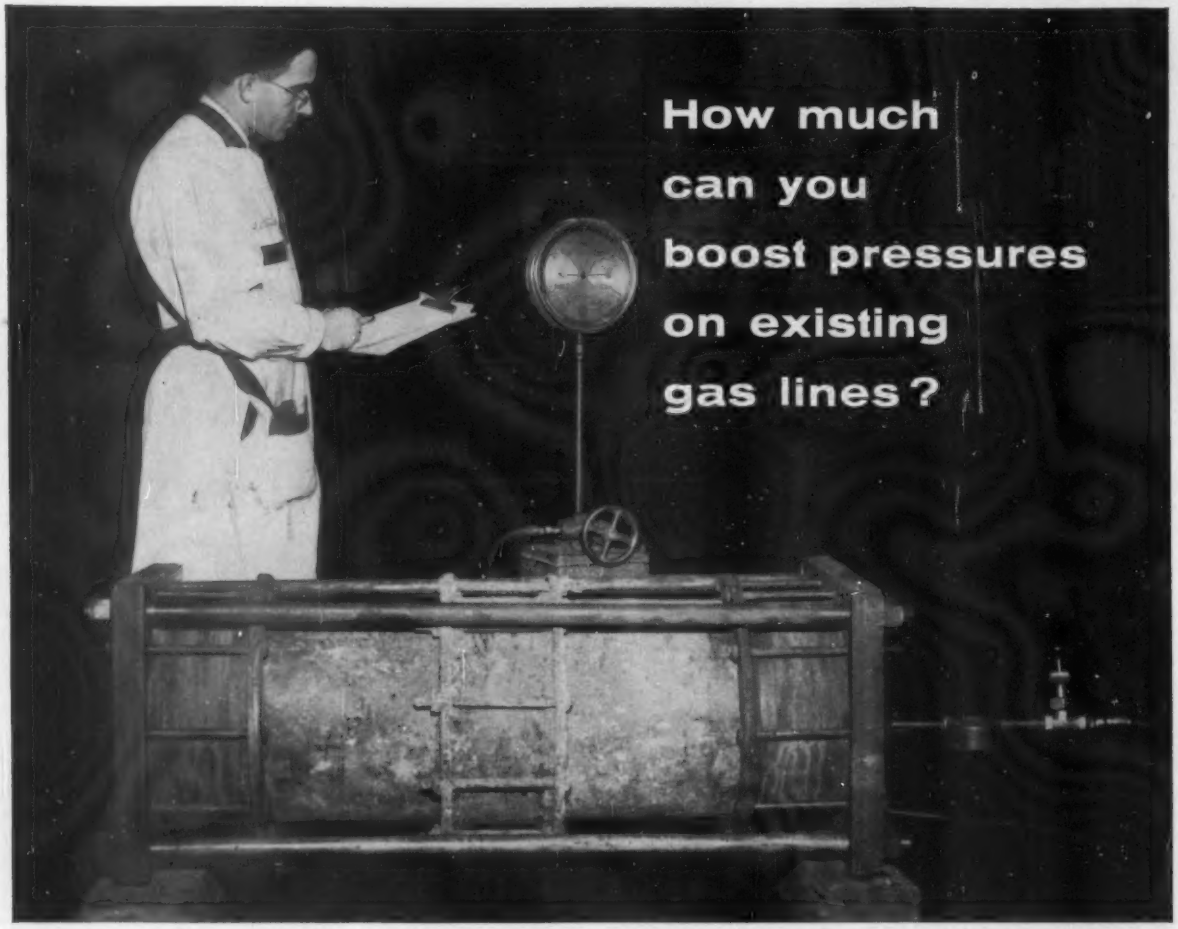
Peoples Gas Light and Coke Co., Chicago — Consolidated Gas Electric Light and Coke Co., Baltimore—Philadelphia Gas Works—Richmond Gas Works, Richmond, Va. — Hartford Gas Company, Hartford, Conn.



MODERN CAST IRON PIPE IS EVEN MORE EFFICIENT

- Centrifugally cast, it's tougher, stronger, more uniform.
- Standardized mechanical joints are bottle-tight under all gas pressures . . . for all types of gas.
- Uniform wall thicknesses.
- Joint design allows deflection during and after installation.
- Service lengths and variety of standard fittings cut time and labor in congested undergrounds.

pipe FOR MODERN GAS DISTRIBUTION



After being buried underground 14 years, this style 38 Dresser Coupling was taken to a testing laboratory and subjected to 1800 psi internal hydrostatic pressure. No leaks appeared.

Here's the story of how one company was able to double pressures on an important line.

By Fred Newell, Chief Product Engineer,
Dresser Manufacturing Division

Here's how Manufacturer's Light & Heat Company, Pittsburgh, discovered it was possible to double pressure on a 14-year-old line: One of their 16" pipelines was originally joined in 1942 with Dresser Couplings. So they asked Dresser to test two sections of pipeline prior to pressure tests on the line itself. In each instance, the sections were dug up and taken to Dresser laboratories without disturbing the 14-year-old couplings in any way. The line previously operated at a maximum of 380 psig.

Couplings tested to 1800 psi

Hydrostatic test equipment was fitted to each section and pressure tests began at zero psi. Pressures were increased in increments of 200 psi and continued up to 1800 psi without a sign of a leak at the Dresser Couplings. At this point the testing equipment reached its limit and the test was terminated.

Even with every other bolt removed, these 14-year-old Dresser Couplings took a pressure of 1375 psi without leaking.

The coupling gaskets were then checked and found to be in excellent condition. Since the couplings were expected to withstand only 600 psig for their new intended use, it was obvious that they could handle the job with plenty of extra strength to spare.

Manufacturer's Light & Heat Company then tested the line in place to 660 psig without leakage, thereby qualifying the line for 600 psig operation. Thus the time-proved dependability and sound engineering principles inherent in Dresser Couplings will provide important savings in rehabilitation costs on these lines and permit an immediate increase in gas service to Manufacturer's many gas customers in Western Pennsylvania.

Your Dresser Sales Engineer will be glad to give you further information . . . or write us direct. Dresser Manufacturing Division, Bradford, Pa. Sales Offices in: New York, Philadelphia, Chicago, San Francisco, Houston, Denver and Atlanta. In Canada: Toronto, Calgary.

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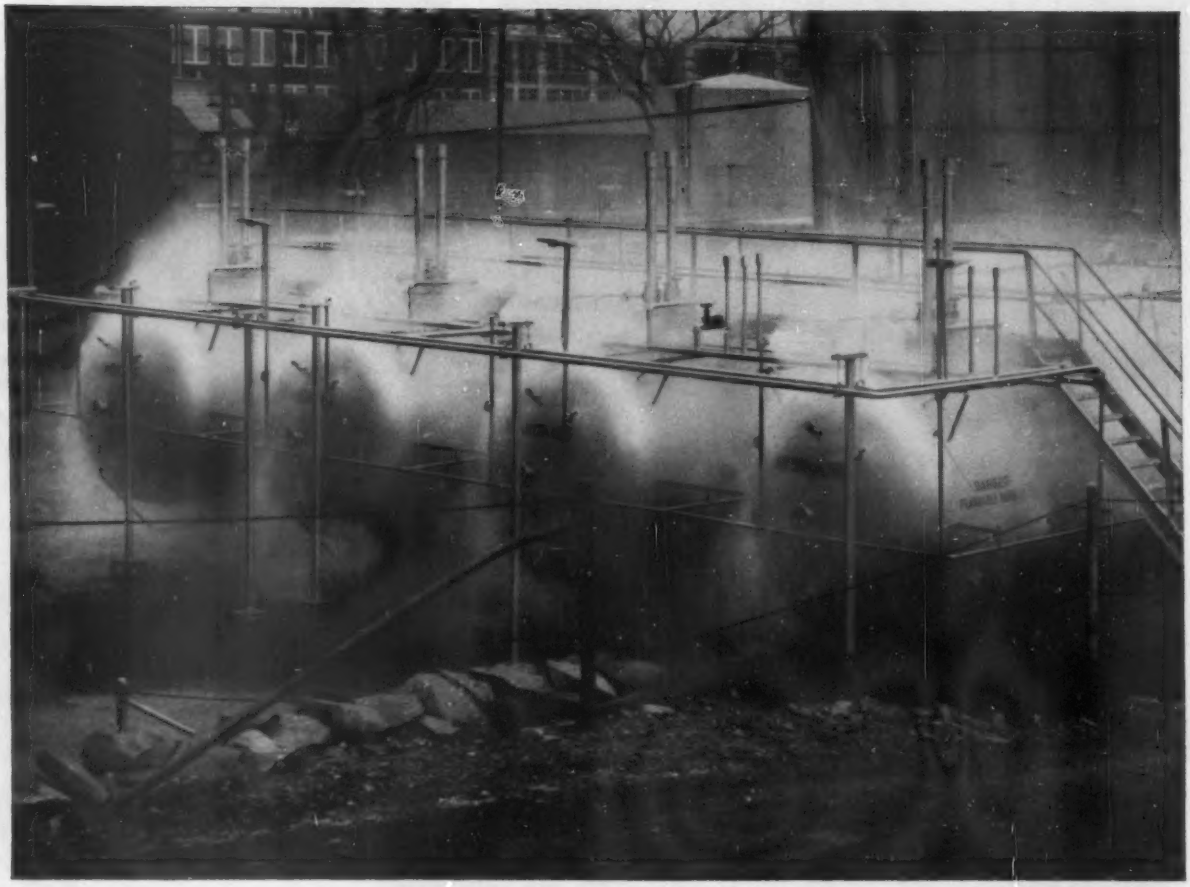

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When heat raises tank temperatures dangerously, a drenching blanket of water provides instant cooling . . . reduces internal pressure and helps prevent rupture. In addition, positive air turbulence is created, even in still air, to assist in dilution of leaking gases by the inert gases present in air. Water-vapor dilution aids in thinning out gas-air mixtures so that they will not burn. Moreover, if gas should ignite, the fire can be localized — permitting safe disposal of the gas by burning where it escapes, thus reducing the fire and explosion hazards downwind or downgrade.

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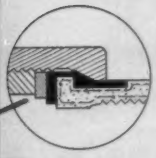
New Wedgeseal -insulated gas cocks combine shutoff and insulation



ECLIPSE *Wedgeseal* INSULATOR
. . . insures positive insulation

CAN'T GET LOST OR LEFT OUT

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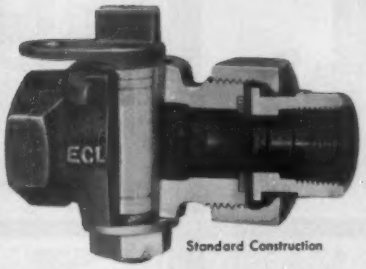
NEOPRENE GASKET
125-lb test. Patent applied for



Standard Construction

Eclipse Wedgeseal-Insulated Gas Cocks currently are stocked in ¾" lock wing patterns. Very shortly they will be available in sizes ¾" through 1¼", both lock wing and flat head styles, standard and "Retained Key" constructions.

Simplifies Installation, Prevents Error, Saves Time and Money

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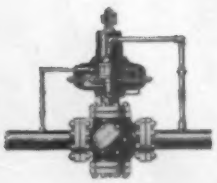
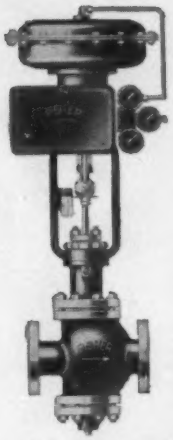
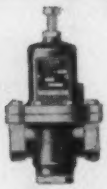
WHAT...a "super market" in this business?



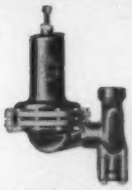


Type 657 with 3500 Positioner

Type 4150 and 4160 Wizard II Pressure Controllers

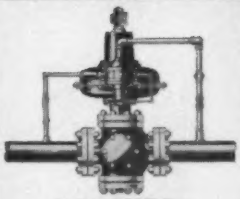


Type 95 Pressure Reducing Valve



Type 630 "Big Joe" Field Regulator

Series 99 Multi-Purpose Gas Regulator



Series 298T Gas Regulators

Type 655-A Pressure Regulator

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

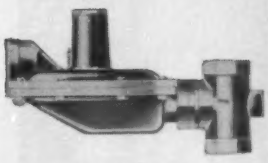
YES! *now you can shop by phone, wire or TWX...* for shipment within 36 hours!

Series 2500-249 and 259B Level-Trols Cage Sizes 14" and 32"

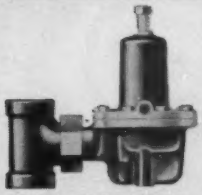
FACTORY STOCK ALWAYS ON HAND:

- **Large Stock of BORDER & DISTRICT REGULATORS**
- **Wide Choice of GAS REGULATORS**
- **Assorted Types of MULTI-PURPOSE REGULATORS**

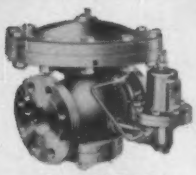
Type 75 Water Reducing Valve



Series S100 and 730 Service Regulators



Series 620 and 621 Farm Tap Regulators



Type 92B Pilot Operated Steam Reducing Valve

Series 67FR Combination Filter Regulator

Fisher's new special service department is organized much like a super market to help you meet emergency requirements with dispatch and speed.

A stock of the popular and standard diaphragm control valves, Wizard Controllers, level-trols and all types of gas regulators are kept on the shelf at all times ready to go.

Every Fisher representative receives a weekly list of all available types for the following week.

Now, when you're up against an emergency, phone, wire or TWX (Marshalltown 578 or 579) the factory or your Fisher representative ... your order will be enroute within 36 hours (except Saturday and Sunday) after it is received in Marshalltown.

FISHER® Controls

SINCE 1880

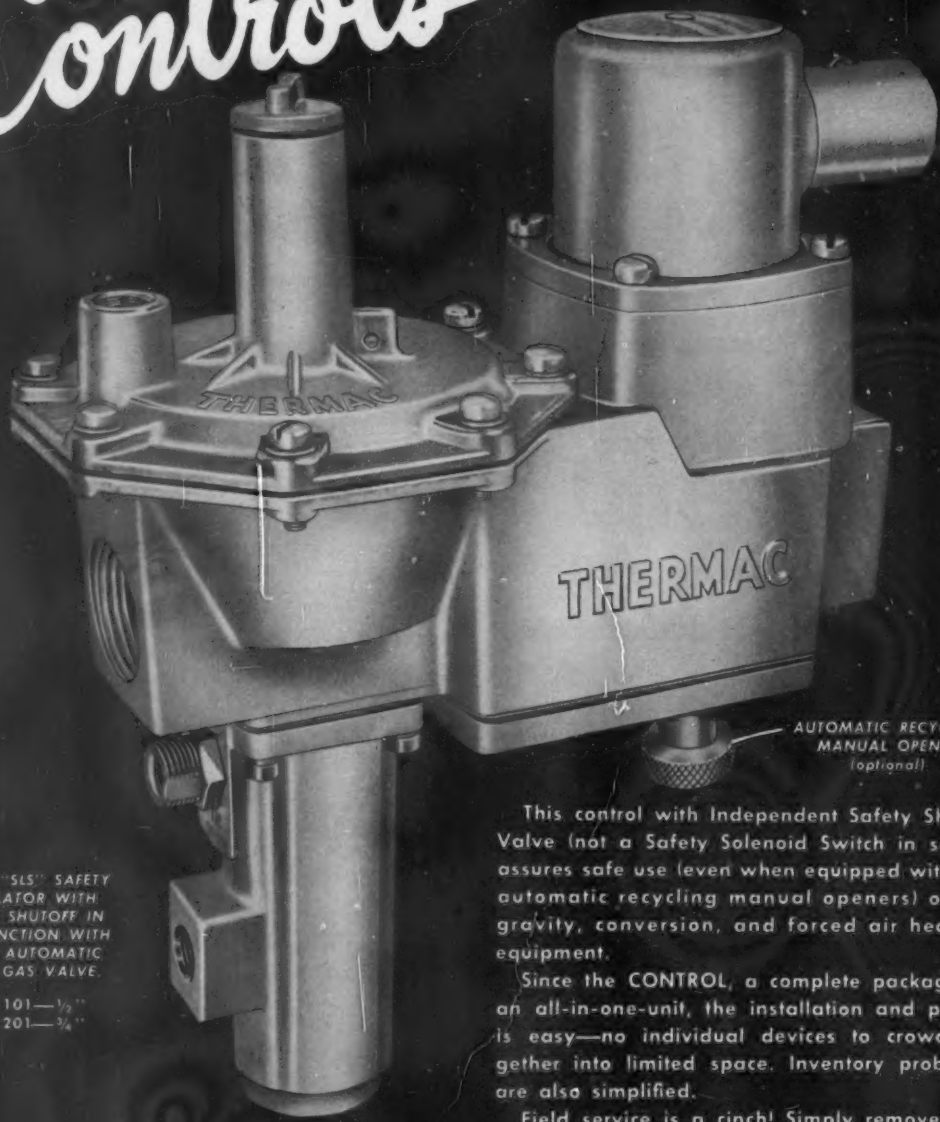
FISHER GOVERNOR COMPANY

Marshalltown, Iowa/Woodstock, Ontario/London, England

SAVE THREE WAYS WITH THERMAC SLS

COMBINATION

Controls



AUTOMATIC RECYCLING MANUAL OPENER (optional)

SERIES "SLS" SAFETY REGULATOR WITH 100% SHUTOFF IN CONJUNCTION WITH QUIET AUTOMATIC MAIN GAS VALVE.

SLS 101—½"
SLS 201—¾"

This control with Independent Safety Shutoff Valve (not a Safety Solenoid Switch in series) assures safe use (even when equipped with the automatic recycling manual openers) on all gravity, conversion, and forced air heating equipment.

Since the CONTROL, a complete package, is an all-in-one-unit, the installation and piping is easy—no individual devices to crowd together into limited space. Inventory problems are also simplified.

Field service is a cinch! Simply remove four screws to dismantle either the safety or solenoid head. Why not check the THERMAC MODEL SLS on your furnaces immediately. You'll enjoy top performance and save three ways: installation time, installation space, and overall control cost. Send for prices and delivery.

THERMAC

HM COMPANY

Certified by A.G.A.

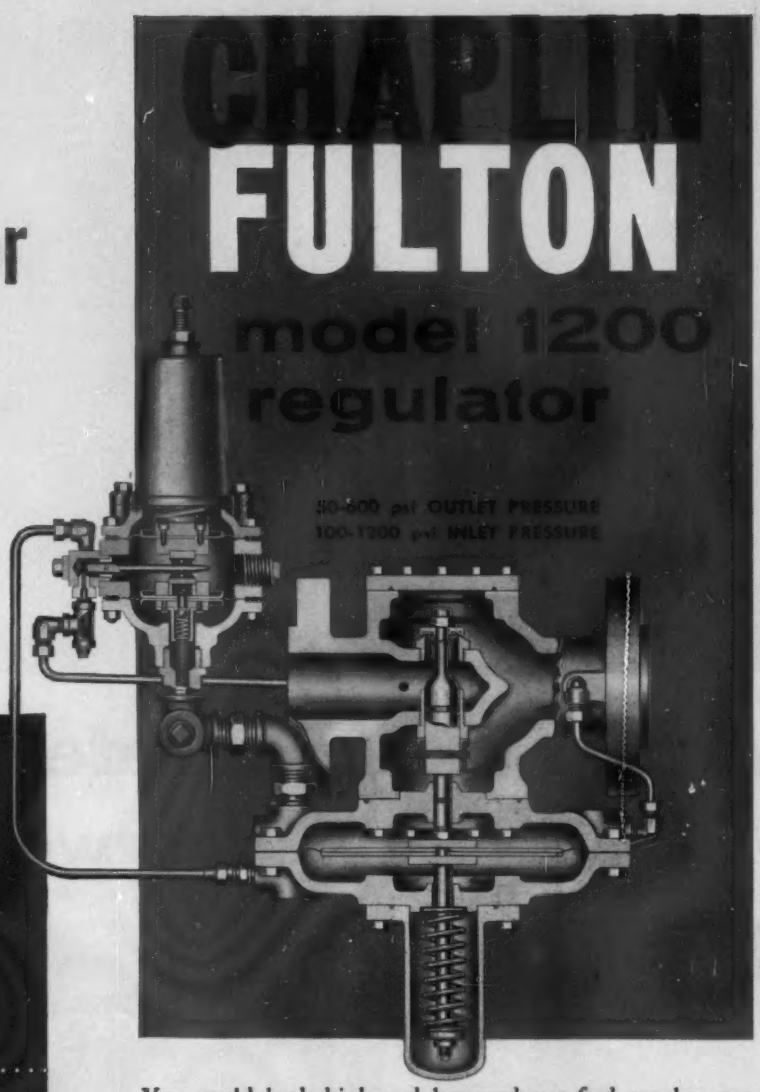
14296 East Sixth Street Corona, California
REdwood 7-3511

Distributed in Canada by ONTOR LIMITED

'1200'

A good number to remember

gives widest range control... no other like it!



- Ready for installation . . . no field connections needed
- All-steel construction . . . stainless steel trim
- Pilot loaded for accurate control
- Large capacities 529,000 cfh at 800 psi inlet

Single seat valve with molded in place disc—balanced against inlet pressure thrust.

Size—2" flanged Series 60 (Series 30 Optional)

Working Pressure—1200 psi (Series 30-600 psi)

Outlet Pressure

With Type S1 Pilot	50-150 psi
Type S2 Pilot	50-300 psi
Type S3 Pilot	50-600 psi

Face-to-Face

Series 60	10½"
Series 30	9¼"

for complete information write for bulletin 1200

You could look high and low and not find another gas regulator like this Model 1200 in the business. It's compact and self-contained, designed for rugged high-pressure service with Chaplin-Fulton accuracy. No field connections needed—a 2" integral unit ready for installation. Actually, this Model 1200 is an all-steel version of our widely accepted Model 1100 . . . now ready to help solve your high-pressure problems.

ACCURATE CP MFG CO DEPENDABLE

WSW 6834

Chaplin-Fulton

MANUFACTURING COMPANY

Pittsburgh 25, Pennsylvania

NOW! a complete new line of full IH factory warranty... quality

10 hp International Cub® Lo-Boy®... lowest cost tractor-help you can get for cutting costs on a wide range of the lighter jobs. You'll be amazed at its productive capacity! Loader lifts 6 cu ft or 450 pounds.

23 hp International 130 gives you utility loader service at low cost... holds down your investment for equipment on odd jobs and seasonal needs. Loader can be used in combination with mowers, blades, etc.

35 hp International 330. New and really *rugged!* Has the built-in 'beef' to handle 1,000 pounds with front-end loader; step up yardage with choice of heavy-duty backhoes that maintain grades, digging 10 or 12-ft ditches.

6 Power sizes . . . unit-engineered for top capacity at lowest cost!

45 hp International 350, with gas, diesel, or LPG engine. Has the built-in brawn to handle ¾-ton with heavy-duty loader. Three models of heavy-duty backhoes match your job and your pocketbook for lowest cost.

57 hp International 450. Over 6,600 pounds built-in operating weight. Loaders handle ¾-cu yd buckets, lift 2,000 pounds over 10 feet. Backhoes take bites up to 10 cu ft, dig 12 or 13½ feet deep.

67 hp International 650 diesel gives you trenching capacity approaching that of small power shovels, with wheel tractor economy and mobility. Loads up to 2,500 lb, digs ditches to grade, as deep as 12 feet.

loaders and backhoes

service and parts available *everywhere*

Whether you buy on price, performance, or service —or all three together—you'll find today's best buy in tractors, loaders, and backhoes at your International Harvester Dealer's. The reasons are many...all sound:

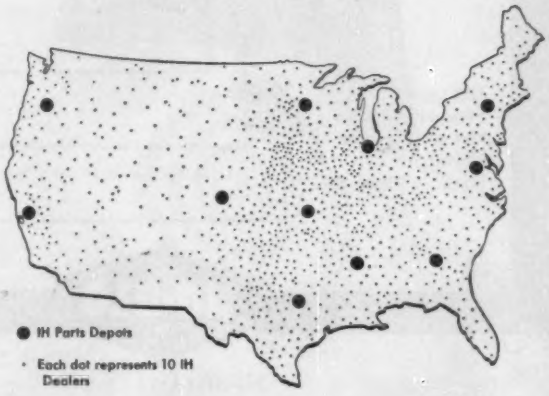
Exclusive high-capacity loader and backhoe designs, manufactured for International Harvester by Pippin and Wagner—recognized leaders in the field.

Fully warranted and nationally distributed by International Harvester Company. Factory-mounting available.

Sizes to match your job most economically—Nine loaders for *six* power ratings of International® tractors, 10 to 67 hp . . . five backhoes and backhoe-loader combinations for 35 to 67 hp models.

Exclusive protection against costly down time—Tractor, loader, and backhoe parts stocked by IH Dealers and at all IH parts depots. (see map)

"One stop" sales-service for all your tractor-loader-backhoe needs saves you time and money . . . see your International Tractor Dealer!



No matter where your job is located, you'll find well-equipped parts and service facilities nearby in the hands of a capable, experienced IH tractor dealer and his factory-trained mechanics. His facilities, in turn, are backed by the industry's most extensive network of parts depots.

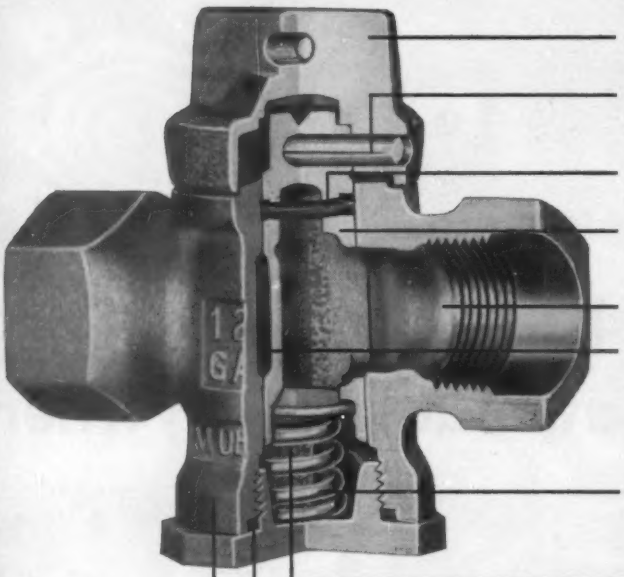
One of the 5,000 IH Dealers is near you. See him for the tractor-loader-backhoe combination sized and priced to meet your specific job requirements. He'll gladly demonstrate! **Financing?** Ask him about the IH Income Purchase Plan.

SEE YOUR
INTERNATIONAL HARVESTER DEALER

International Harvester Products *pay for themselves in use* . . . Farm Tractors and Equipment . . . Twine . . . Commercial Wheel Tractors . . . Motor Trucks . . . Construction Equipment—General Office, Chicago 1, Illinois

MUELLER®
inverted key gas curb stops

Gas-tight and easy turning without maintenance!



Large bronze cap protects ground key surfaces. Downward pressure on cap unseats key slightly for easy turning. Skirt on cap shears ice or other foreign material.

Shear-resistant silicon bronze drive pin solidly anchors cap to key.

"O" ring provides gas-tight double seal at top of key to prevent leakage—even when key is unseated while operating stop.

Heavy inverted bronze key is accurately machined and individually ground and lapped into the body to prevent leakage without lubrication.

Recessed thread ends add strength and corrosion resistance to pipe joints.

False ports in body and key line up with true key and body ports when stop is closed. This prevents grit or dust from sticking to the polished ground key seating surfaces and later damaging them.

Stainless steel spring seats the key and permits it to be unseated for easy turning. Gas pressure on the bottom of the key aids the spring and the seating pressure increases with the inlet pressure.

Compressible material inside of spring prevents breakage by absorbing the pressure created by condensed moisture freezing in the bottom of the stop.

Totally confined "O" ring provides a positive seal at the bottom of the stop and prevents leakage along the service line.

Heavy cast iron body of close-grained grey iron and base plug of malleable iron give maximum strength and resistance to corrosion.

125 pound
Straight Way
Flat or Square Head
Black only
Sizes: ¾" through 2"

NO-BLO®

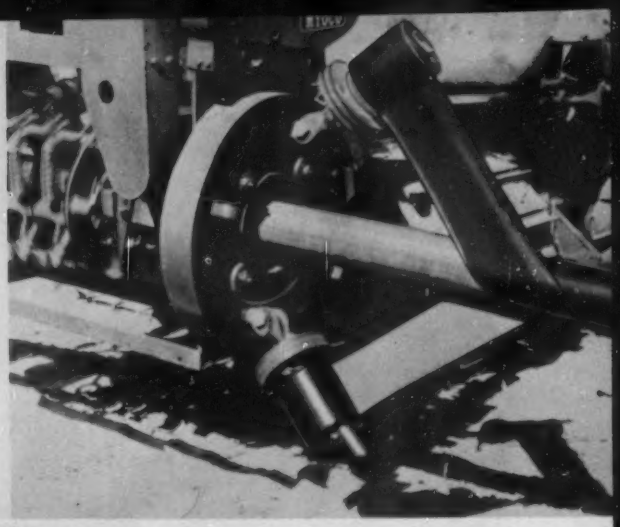
See Section 7 of your Mueller Gas Distribution Catalog G-97 for complete information on the full line of dependable Mueller gas curb stops. If you have misplaced your copy, or would like additional copies, write direct to:

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles; In Canada: Mueller, Limited, Sarnia, Ontario

Cutting-In Type Inverted Key Gas Curb Stop with Dresser Coupling Style 90 inlet and outlet. This stop permits cutting-in a curb stop in an existing line or to replace old inoperable or leaking curb stops.
Black Only
Sizes: ¾" through 2"

NOW... THE LEADER IN
PROTECTIVE PIPE COATINGS
AND WRAPPER COMBINATIONS
BRINGS YOU...



Dearborn® F.O.S. Safe-T-Clad®

THE SUPERIOR POLYETHYLENE
PRESSURE-SENSITIVE TAPE

Actual sample of
Dearborn No. 655
F.O.S.
Safe-T-Clad Tape

- *GREATER ADHESIVE PROPERTIES*
- *GREATER TENSILE STRENGTH*
- *THICKER, MORE UNIFORM*

YET COSTS NO MORE!

Dearborn F.O.S. Safe-T-Clad gives you all these advantages: reduced labor costs . . . the elimination of equipment and dope kettles . . . lower shipping, handling and warehousing costs.

The big reason why you'll like this new Dearborn tape better is because of its proven superiority. For example: its greater thickness means more lasting protection; its greater elongation and adhesive properties mean surer protection. *For other points of superiority, check the performance properties table on the next page.*

Dearborn F.O.S. Safe-T-Clad may be applied by hand or Traveliner, comes in widths from 1" to 15", in lengths to suit your needs.

Write for informative booklet—

meanwhile...

check the performance properties table on the next page

Dearborn® CHEMICAL COMPANY
MERCHANDISE MART PLAZA • CHICAGO 54, ILLINOIS

WORLD'S MOST COMPLETE LINE OF PROTECTIVE MATERIALS FOR THE CONTROL OF CORROSION

PERFORMANCE PROPERTIES

OF DEARBORN NO. 655 F.O.S. SAFE-T-CLAD TAPE

PHYSICAL	TEST METHOD	DATA
Color		Black
Backing Material		Polyethylene
Adhesive		Synthetic
Thickness:		
Backing	ASTM D-1000-48T	10 mils
Adhesive	ASTM D-1000-48T	3 mils
Total Thickness	ASTM D-1000-48T	13 mils
Moisture Vapor Transmission Rate	JAN-P-127	0.2 gm./100 sq. in./24 hr.
Moisture Absorption	ASTM D-570-42	0.02%
Tensile Strength (2" width) (Machine direction)	ASTM D-1000-48T Mod.	30 lbs./1" grab
Tensile Strength (2" width) (Cross direction)	ASTM D-1000-48T Mod.	30 lbs./1" grab
Elongation (Machine direction)	ASTM D-1000-48T Mod.	500% plus
Elongation (Cross direction)	ASTM D-1000-48T Mod.	500% plus
Tear Resistance (Machine direction)	ASTM D-689	Not less than 950 gm.
Tear Resistance (Cross direction)	ASTM D-689	Not less than 950 gm.
Adhesion to steel	ASTM D-1000-48T Mod.	Min. 43 oz./1" width
Adhesion to backing (180° pull)	ASTM D-1000-48T Mod.	Min. 32 oz./1" width
*Temperature performance range	Dearborn	−30° F. to 200° F.
Weatherometer	Dearborn	No effect/70 hrs.

ELECTRICAL	TEST METHOD	DATA
Dielectric Strength	ASTM D-1000-48T Mod.	Min. 15,000 volts
Insulation Resistance	ASTM D-257	One million megohms

RESISTANCE TO:	TEST METHOD	DATA
Acids, Inorganic and Organic (Aqueous solutions)	Dearborn	Excellent
Alcohols (Water soluble)	Dearborn	Excellent
Alkalies	Dearborn	Excellent
Amines (Aqueous solutions)	Dearborn	Excellent
Animal Acids	Dearborn	Excellent
Bacteria	Dearborn	Excellent
Fungi	Dearborn	Excellent
Hydrocarbons, Aliphatic	Dearborn	Fair
Hydrocarbons, Aromatic	Dearborn	Fair
Ketones, Esters (Aqueous solutions)	Dearborn	Good
Oils	Dearborn	Fair
Salt Water	Dearborn	Excellent
Vegetable Acids	Dearborn	Excellent
Water	Dearborn	Excellent
Weathering	Dearborn	Excellent

*Dearborn #655 F.O.S. Safe-T-Clad Tape will retain its physical quality within this range of temperatures, but application should only be undertaken at temperatures above 32°F.

STANDARD ROLL

13 Mils Thick—On 1½-in. ID Cores

STANDARD PACKING

Roll Size	Rolls Per Case	Rolls Per Square	Squares Per Case
1" x 100 Ft.	48	12	4
2" x 100 Ft.	24	6	4
4" x 100 Ft.	12	4	4
6" x 100 Ft.	8	2	4
9" x 100 Ft.	4	1⅓	3

We can furnish rolls in 200 and 300 foot lengths, and widths not shown at left, upon request, and subject to manufacturing availability. *Dearborn #655 F.O.S. Safe-T-Clad Tape is sold in case lots only.*

TRAVELINER ROLL

Traveliner Rolls can be manufactured to order in 400, 600 and 800 foot roll lengths on 3 inch I.D. cores in 10 inch and 15 inch widths only.

Price information, samples and name of nearest Distributor will be supplied upon request.

KEEP THIS DATA IN YOUR FILE UNTIL YOU RECEIVE THE INFORMATIVE BOOKLET OFFERED ON PREVIOUS PAGE

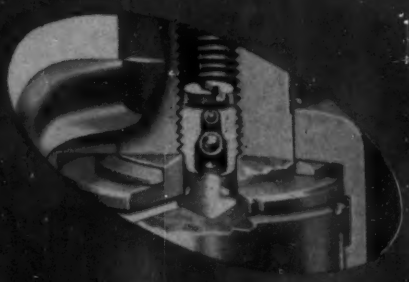
Dearborn®

CHEMICAL COMPANY

MERCHANDISE MART PLAZA • CHICAGO 54, ILL.

In the spots that count... Homestead Valves are

LEAKPROOF



Reinforced Teflon seal

Controlled pressurized lubricant seal

Lower cost per year valve service is guaranteed by Homestead Lubricated Plug Valves. These are the features that make them leakproof and extend their useful life . . . reinforced Teflon* head seal, double ball and lubricant sealed check valve, and their exclusive controlled pressurized lubricant seal.

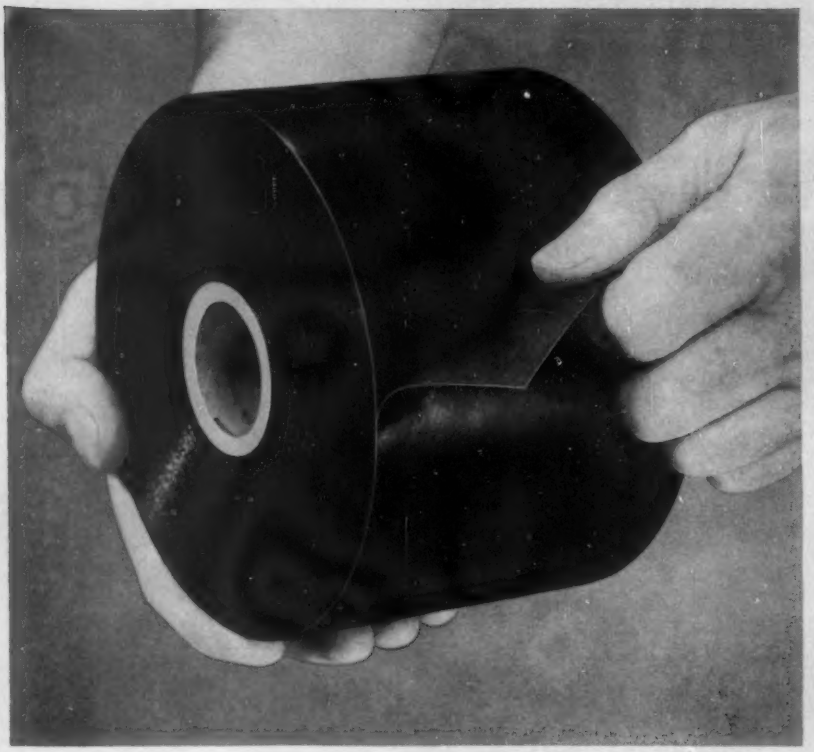
Homestead's controlled lubricating system forces a chemical film over all sealing surfaces at more than 300 pounds pressure. In addition, it prevents sticking, by its piston-like movement of the plug during each lubrication. See how Homestead fills your valve needs. Write today for Reference Book 39, (Section 5), for complete information on Homestead Lubricated Plug Valves.

DuPont registered trademark.

h
v

HOMESTEAD VALVE MANUFACTURING COMPANY

P. O. Box 405 • Coraopolis, Pa.



New low price! SCOTCHRAP BRAND PIPE PROTECTION TAPE

REG. U.S. PAT. OFF.

...the superior pipe coating

"SCOTCHRAP" Pipe Protection is polyvinylchloride plastic in handy tape form . . . a pipe coating tape designed especially for long term pipe protection. Compared to all other pipe coatings and coverings, "SCOTCHRAP" Brand Pipe Protection Tape is superior in these important qualities: *Toughness*—to resist abrasion from backfilling and underground soil stresses. *Lower conductance*—to resist electrolytic corrosion and insure longer pipe life. *Adhesion shear strength*—"SCOTCHRAP" sticks at a touch . . . and stays in place despite shear forces exerted by soil stresses. All this, plus new low prices, make "SCOTCHRAP" Pipe Protection Tape *your best buy*. Best for joints and fittings—best for total coatings of entire distribution systems!

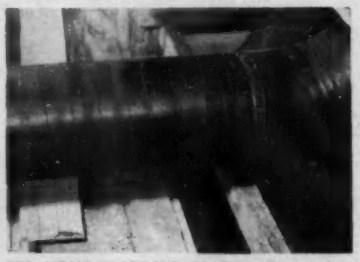
Check into the new savings possible with "SCOTCHRAP" Brand Pipe Protection Tape. You'll be glad you did!

"SCOTCHRAP" is a registered trademark for pipe protection products made in U.S.A. by Minnesota Mining and Manufacturing Co., St. Paul 6, Minn.

"SCOTCHRAP" Pipe Protection Products

LOOK what you can do with "SCOTCHRAP"

STOP CORROSION completely! This photo shows far pipes covered with "SCOTCHRAP" . . . near pipes covered with other coating . . . leading into compressor station cooling tower. Pipes were subjected to acid and chlorine-bearing water for two years . . .



SEE HOW "SCOTCHRAP" Pipe Protection guarded this pipe. This close-up shows how pipe was so perfectly intact, you could still see imprint of "SCOTCHRAP" Adhesive on the prime coat.

MAKE QUICK WORK of insulating joints, tees, elbows in the field. Superconformable "SCOTCHRAP" goes on easily, quickly, without special tools or heat . . . gives positive system-wide protection.

SAVE TIME on long lines. With wide-width "SCOTCHRAP" and "Betzel" Tapester, one man covers 200 feet of 4" pipe in less than 30 minutes. For complete information, write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. CT-28.

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Clyde Wilkinson, Mgr. Water Heater Products, demonstrates speedy delivery of hot water.

American-Standard water heater—138° hot water after full 30 minutes

As a big blue flame swept the bottom of the new American-Standard gas water heater, a shower, automatic washer and dishwasher connected to it were turned on. While utility officials watched, gallon after gallon of pure, hot water poured into all three appliances. Water temperature was taken every ten minutes. At the end of half hour—the water was still a piping-hot 138°.

Features of the all-new American-Standard water heater that made the demonstration possible: large burner that heats water as much as 25% faster than other models, thick, Fiberglas insulation, and a baffled center flue that keeps maximum heat in the tank.

Many sizes, glass-lined or galvanized tanks, de luxe or budget models. Get full details from AMERICAN-STANDARD, PLUMBING AND HEATING DIVISION, 40 W. 40th Street, New York 18, N. Y.

Performance-rating of each model now makes sizing and selling easier than ever. Customer uses chart to match hot water needs of home to correct-size heater.

American-Standard & "Standard" are trademarks of American Radiator & Standard Sanitary Corporation

AMERICAN-Standard PRODUCTS

AMERICAN-Standard

PLUMBING AND HEATING DIVISION

THE ANSWER TO CONNECTION PROBLEMS

BRANCH CONNECTIONS

MADE UNDER PRESSURE

The best and most economical method of making lateral or branch connections is to use Smith All Mechanical Joint Tapping Sleeves and Valves or Stopper Pieces. This method ELIMINATES GAS SHUT OFF and the permanent, leak-proof installation is achieved speedily by employing these simple procedures: 1. Block Sleeve Outlet Half under pipe, position side flange gaskets, bolt Sleeve halves together. 2. Position end joint gaskets; install follower rings, bolts and nuts. 3. Rotate Sleeve outlet flange to desired position, tighten follower ring nuts. 4. Tighten side flange gasket compression screws. 5. Attach Tapping Valve. The installation is complete and ready for tapping. 5. (Alternate) Stopper Pieces may be used in place of Valves when connections are made to low pressure mains and permanent shut off Valves are not needed; however, the use of Tapping Valves is recommended. The cost of the connection is reduced by quicker installation, elimination of skilled labor and costly jointing material. Bulletin will be sent on request.

51

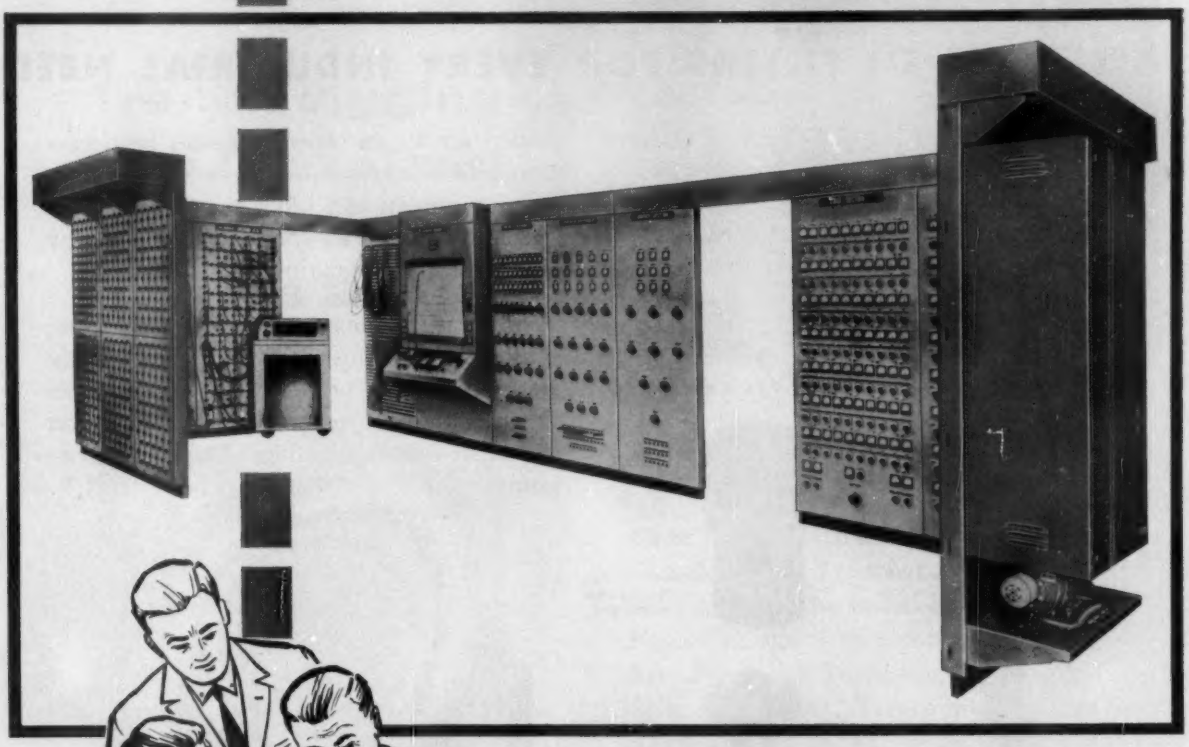
FIRE HYDRANTS · VALVES · SINCE 1896

THE A.P. SMITH MFG. CO.

EAST ORANGE, NEW JERSEY

how do YOU handle

SYSTEM ANALYSIS?



By careful calculations utilizing fully your engineering training and experience? Or does the pressure of time dictate using "seat of the pants" methods?

With greatly increased work loads . . . continuing population growth . . . and rapid development of suburban areas . . . most engineering departments are hard pressed for time to make adequate, accurate system analysis.

To overburdened engineering departments, the McIlroy Fluid Network Analyzer . . . by STANDARD . . . has been a lifesaver! *Accurate, complete* system analysis that would require *days* of engineering effort is completed in *hours*.

And only with the McIlroy Analyzer can you test your plans *in advance* . . . have a *visual* representation of system condition . . . protect against a wrong guess that can be so costly in materials, time, and labor.

Write today for descriptive Bulletin No. 183

STANDARD
TRADEMARK

THE STANDARD ELECTRIC TIME COMPANY | **89 LOGAN STREET SPRINGFIELD, MASSACHUSETTS**

ALSO MANUFACTURERS OF:

Emergency Lighting Equipment

Laboratory Panels

Hospital Signalling Equipment

Clock and Program Systems

Precision Timers

PROTECTOMOTOR

STAYNEW FILTERS

DOLLINGER

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

Dollinger makes ALL TYPES of filters as shown on this page, plus special filters for unusual filtration problems. New users of one specific type of Staynew filters often find a second Dollinger filter performs a great, added service in other processes or operations. Dollinger maintains complete engineering, design and laboratory facilities for the development of special filters for new and unusual applications.

Write for complete information on any of the Staynew filters illustrated. Be sure to specify Bulletin Number or Numbers. Consult Dollinger Engineers on any special filtration problems—no obligation. Dollinger Corporation, 68 Centre Park, Rochester 3, N.Y.

PIPE LINE FILTERS

Model CPH
Pipe Line Filter
Bulletin 200

Model CVH (Vacuum)
Pipe Line Filter
Bulletin 200

Model AAPHS
(Absorption)
Pipe Line Filter
Bulletin 200

Model HPH and AHPH
(High Pressure)
Pipe Line Filter
Bulletin 200

LIQUID FILTERS

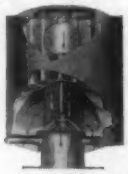
Model HE (Sump)
Liquid Filter
Bulletin 330

Model ELS (Pressure)
Liquid Filter
Bulletin 300

AIR INTAKE FILTERS

Model IDR
(Ground Level)
Air Intake Filter
Bulletin 100

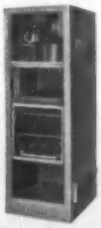
Model DS (Silencer)
Air Intake Filter
Bulletin 100



Model D (Outdoor)
Air Intake Filter
Bulletin 100

Model C (Indoor)
Air Intake Filter
Bulletin 100

VENTILATION FILTERS



Electro-Staynew
Mist Collector
Bulletin 420

Electro-Staynew
Precipitator
Bulletin 400

Automatic
Ventilation Filter
Bulletin 500

Dry and
Viscous Panel
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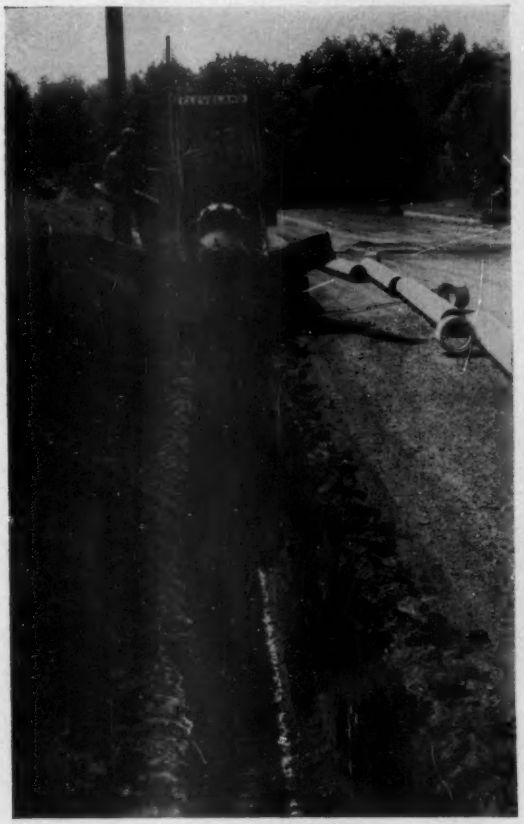

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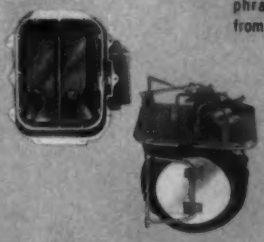

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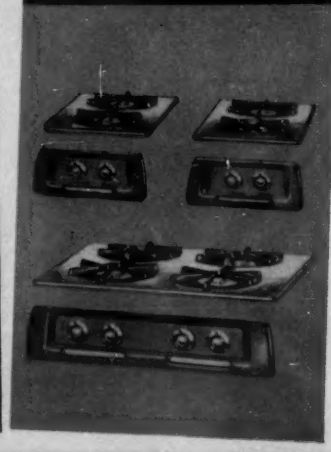

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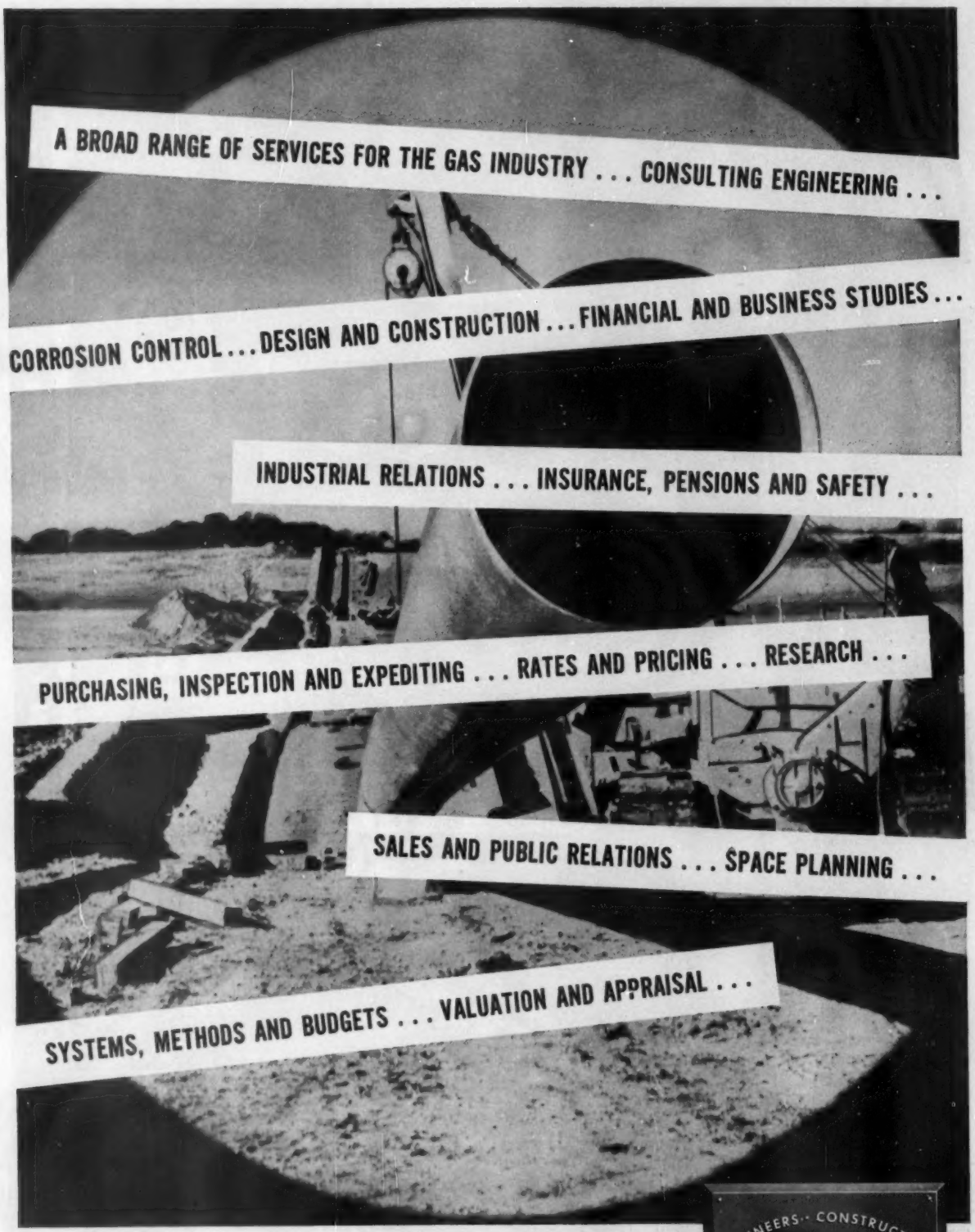
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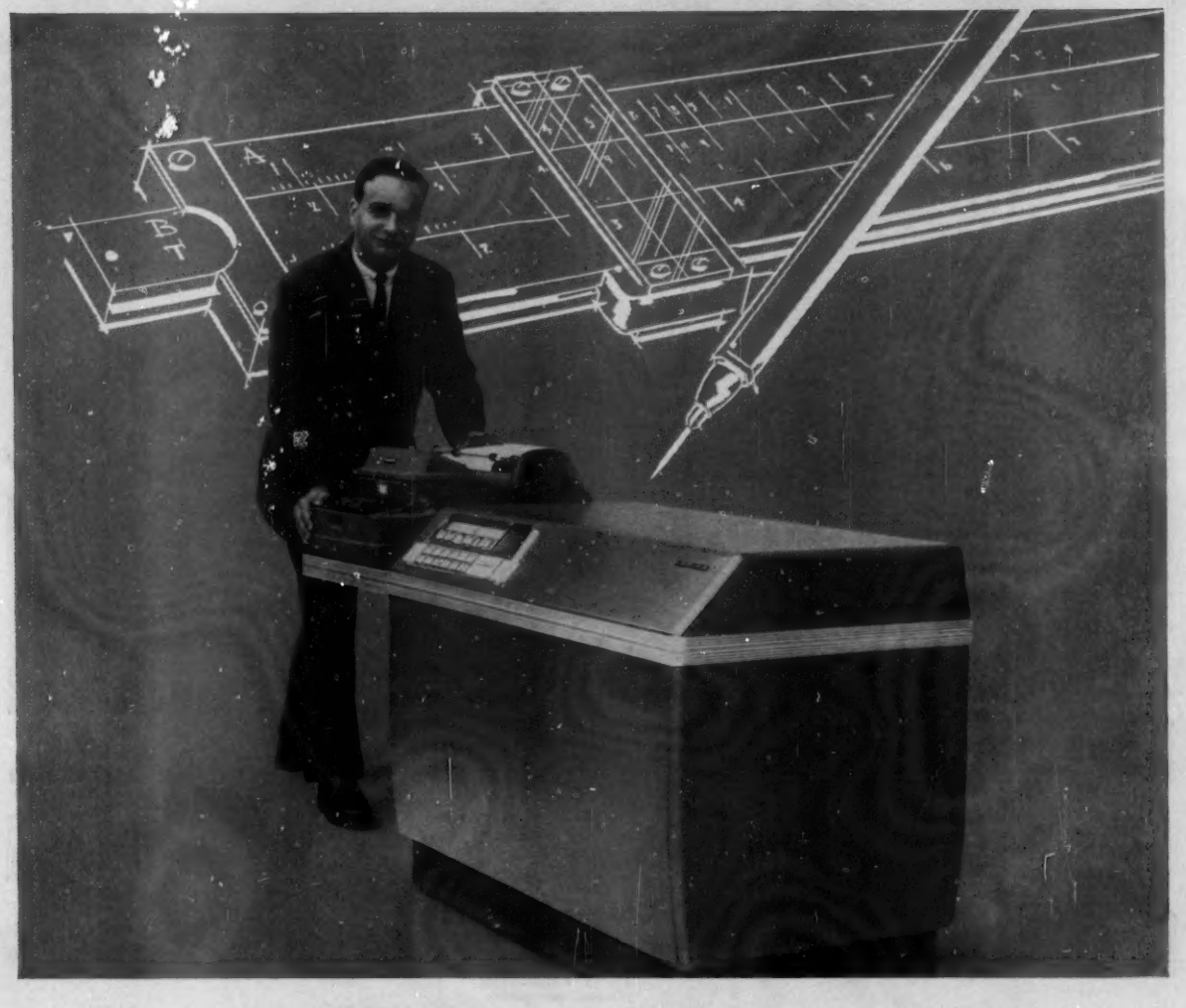

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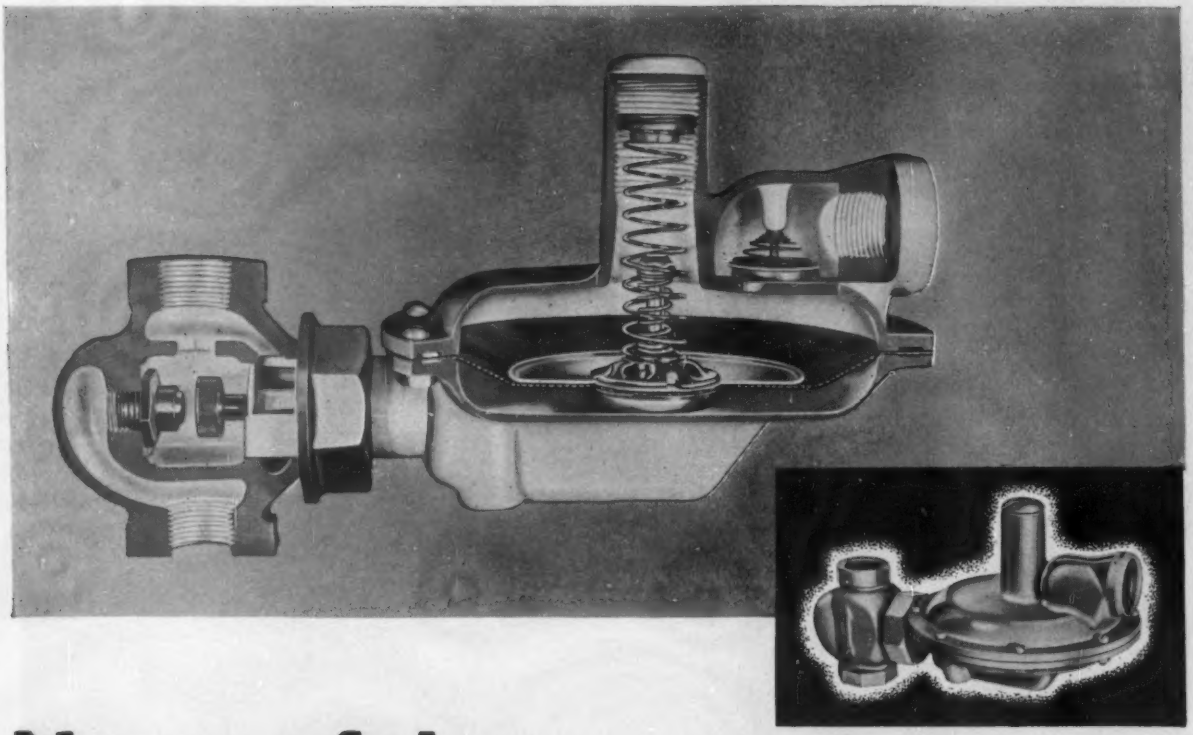

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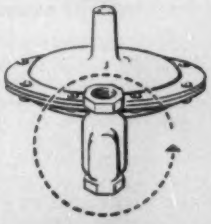

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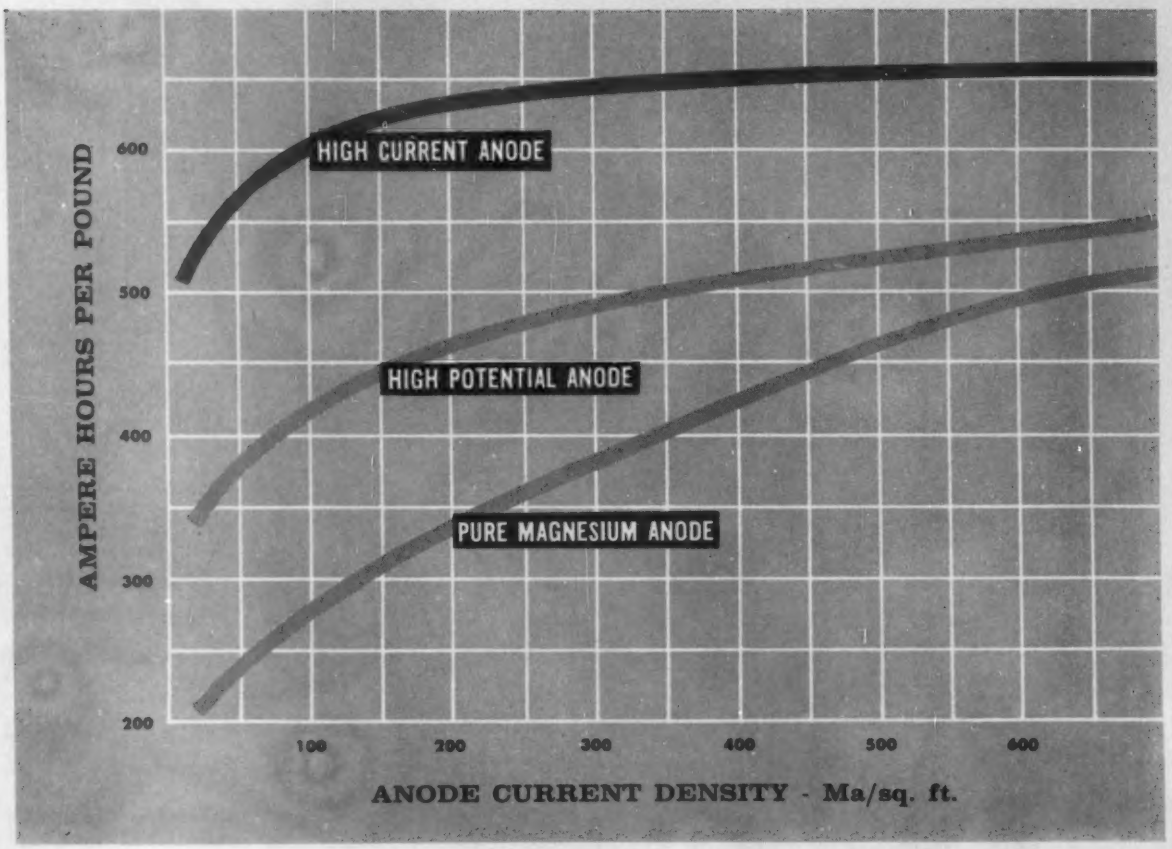

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Is your LPG storage safe?

GAS exclusive

By HERBERT F. JEWSON

Philadelphia (Pa.) Electric Co.

Fig. 1. The No. 2 LPG tank farm at West Conshohocken after modification.

At the close of World War II, many gas manufacturing utilities found their maximum day production facilities insufficient to meet the forecasted peak demand. Liquefied petroleum gas, then mostly butane, was found to be a satisfactory source of peak shaving gas.

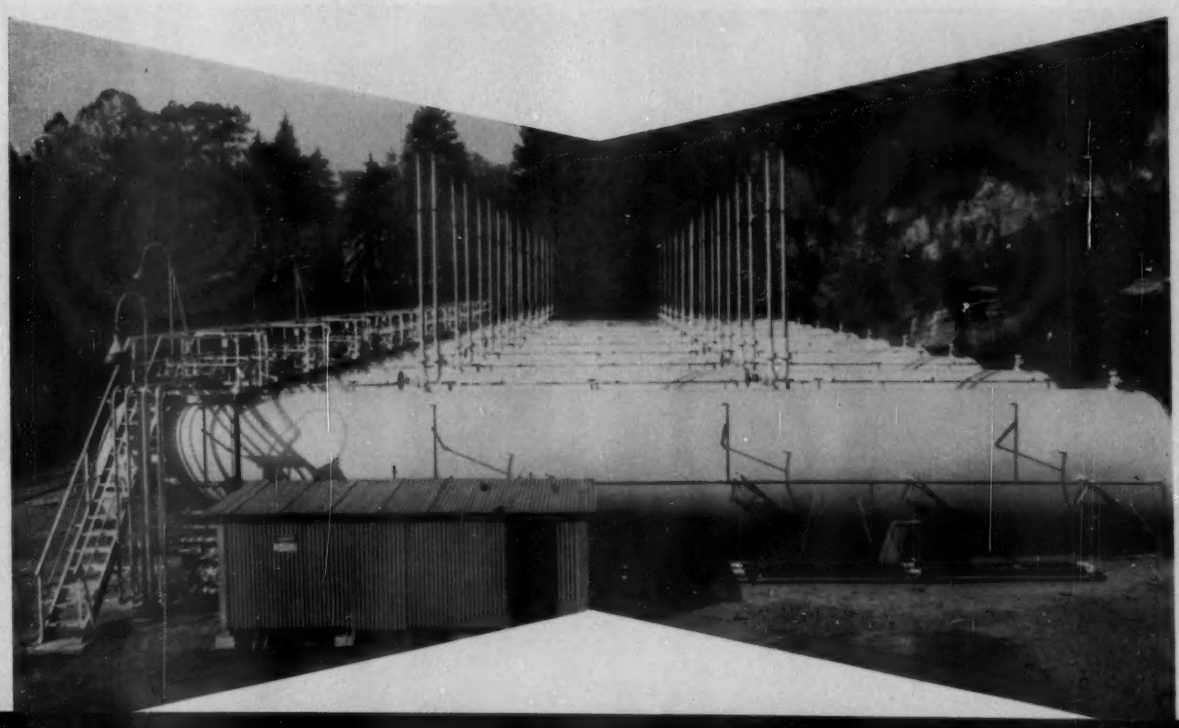
The installation of LPG storage facilities or tank farms provided the standby reserve capacity for the peak shaving operation. These installations were in many cases designed only for the use of butane and without compliance to any standardized code for LPG storage construction.

The increased use of propane revealed deficiencies in some installations and many utilities reevaluated their existing tank farms.

The Philadelphia Electric Co., serving more than 200,000 gas customers in five suburban counties of Philadelphia, surveyed its storage facilities and modified them in compliance with the latest revision of the NBFU Pamphlet 59.

The LPG storage facilities at the West Conshohocken plant of the Philadelphia Electric Co are contained in two separate tank farms of 10 30,000-gal. (water capacity) tanks each, having a maximum allowable storage of 500,000 gal. of LPG—in our case, propane.

After a comparison of the pro-



visions of the LPG code with the actual installation it was decided to make a complete modification of the tank farm to comply with the new code. Accordingly, work was started on the No. 2 LPG tank farm, and was completed recently. This article summarizes this modification, and points out its salient features.

Fig. 1 shows the No. 2 LPG tank farm at West Conshohocken after the modification had been completed.

Safety valves

The tanks formerly had two individual safety valves with risers, installed on each manhole head. After modification, the tanks now have four 4-in. safety valves installed, grouped in pairs, and located at each one third of the tank length. Using a three-way valve (*Fig. 2*), one of the safety valves of the pair is always in service, while the other is on standby. With two safety valves on each tank always in service, the code minimum rate of discharge requisite is more than satisfied.

This new three-way valve design permits the removal from service of a weeping safety valve by merely turning the three-way valve wheel, which places the other safety valve in service. It is then possible to replace the gasket or remove the defective safety valve for repairs. The former method of safety valve installation required that the tank be emptied, and purged, before a safety valve could be serviced or maintained.

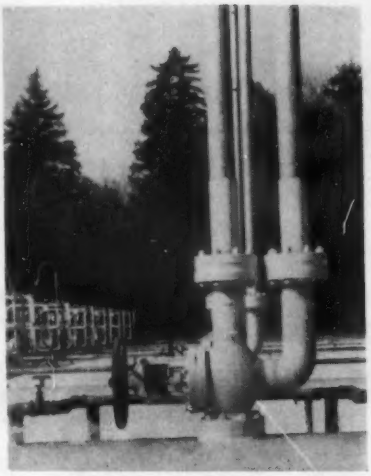


Fig. 2. Safety valves installed in a three-way valve. One safety valve is in service at all times.

With this arrangement it is possible to remove a plug in the valve body and insert a testing hookup. This enables the safety valve to be checked in place, both for popping pressure and tightness.

Fire protection spray system

In addition to the normal tank spray cooling system, this farm is now equipped with a fire protection spray system. This water is used for the sole purpose of keeping equipment, foundations and piping cool in the event of fire and, although not for propane fire extinguishment, helps to localize its spread.

Fig. 3 shows the relative position of the spray heads between adjacent tanks.

Fig. 4, taken from the same position, shows the spray system in operation. The water atomization is complete and the tanks are covered with a heavy mist.

Fig. 5 shows the relative location of the two position indicating valves that control the fire protection sprays. A 6-in. city water main is Y-connected at these two valves. The left hand valve controls the 6-in. feed to the far five tanks while the right hand valve controls the water to the near five tanks. Automatic draining of the water feed lines to prevent freezing is achieved by the operation of a reverse connected pressure regulator. The relatively remote position of these valves with respect to the tank farm is a purposely designed safety feature to permit operation from a distance in the event of a fire.

Fire detection devices

The tank farm is protected by fire detection devices which, when actuated by heat, ring an alarm in the main control center of the

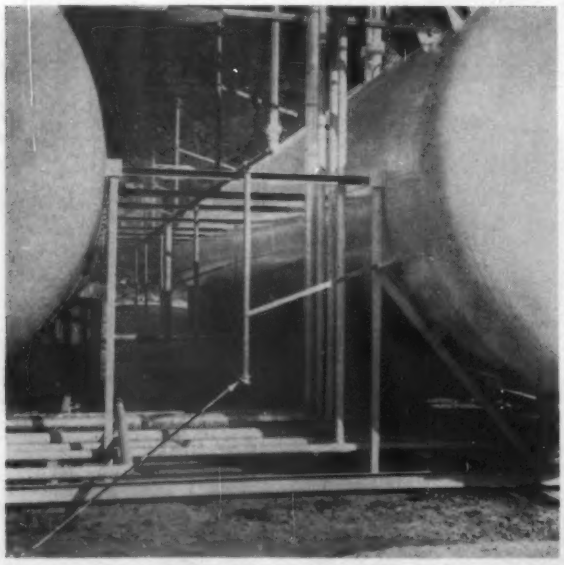


Fig. 3 (left). Fire protection water header and spray nozzles.

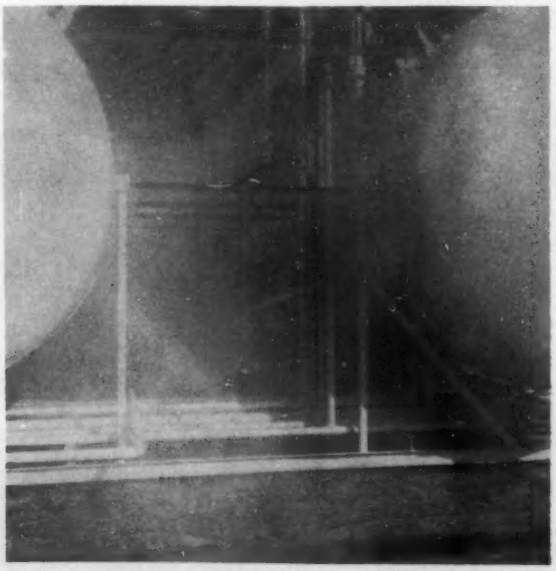


Fig. 4 (right). Fire protection water sprays in service.

plant. These devices are located over each tank cover, between tanks, and in the compressor shed.

Fig. 6 shows one of these devices located above a tank cover. *Fig. 7* is a close up view of the device.

Fig. 8 is a cross section view showing the internal parts.

This device is an ultrasensitive electric thermostat for the detection of fire. Unlike most thermostats, it functions with dual action, using two independent methods of fire detection—rate of rise, and fixed temperature.

Rate-of-rise principle of operation. Basically, the rate-of-rise element consists of an air chamber, a flexible metal diaphragm, and a moisture - proof trouble - free vent which is carefully calibrated at the factory.

Air expands as it is heated, and contracts as it is cooled. For normal, day-to-day fluctuations of temperature, the expansion and contraction of the air within the chamber is automatically compensated by the "breathing" action of the vent. However, when a fire occurs, air temperature rises very rapidly and the air in the chamber expands faster than it can be vented. This creates a pressure which distends the diaphragm and closes the electrical contacts.

The rate-of-rise action is not related to any fixed temperature level, but responds with the utmost promptness when the rate of temperature rise exceeds 15° per minute.

If the heat is subsequently removed, the air within the chamber contracts, thus relieving the pressure, and the thermostat automatically restores itself to normal open circuit position.

Fixed temperature principle of operation. This is entirely independent of the rate-of-rise element, and consists of a phosphor bronze spring held under tension by standard sprinkler fusible solder.

In the instance of a very slow smoldering fire where the temperatures do not increase rapidly enough to operate the rate-of-rise element, when the thermostat finally becomes heated to 190°F, the fusible solder melts and releases the spring, which closes the electrical contacts.

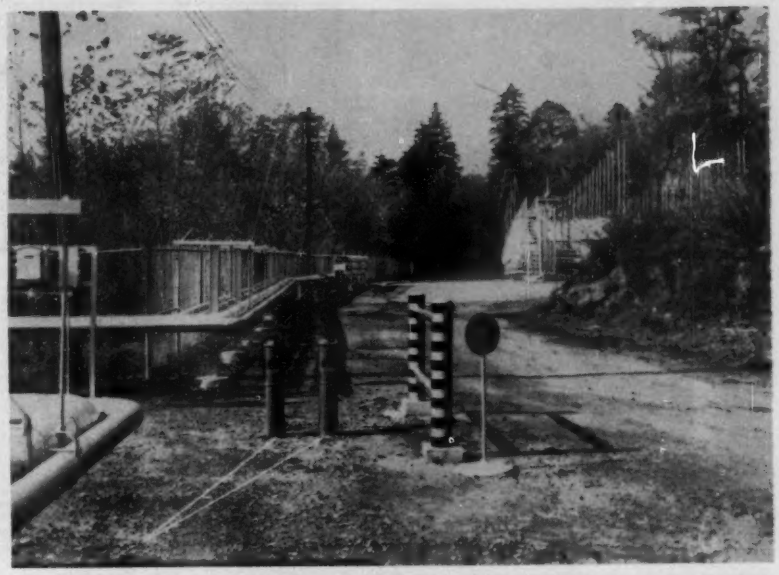


Fig. 5. Main fire protection water spray valves.

When the thermostat operates from the fixed temperature principle it cannot be reset and must be replaced. For this reason, a special "tell-tale" indicator is provided in the form of a small button on the shell. When the fixed temperature spring is released this button immediately becomes a hole in the shell, and becomes an easily spotted indication of which unit has fused and needs replacement.

Pipe expansion

The code states that "piping connection between container and manifold should be designed to provide adequate allowances for contraction, vibration and settlement."

Fig. 9 shows the expansion loops of the piping under the tanks. The manifolds are anchored and the expansion loops take up the changes in pipe length and stress. The piping is independently slung from the tank saddles and settlement cannot affect piping stress.

Fig. 10 shows a view of the expansion loop on the interconnecting piping between tank farms. This piping is vertically hung from pipe supports and there is ample provi-

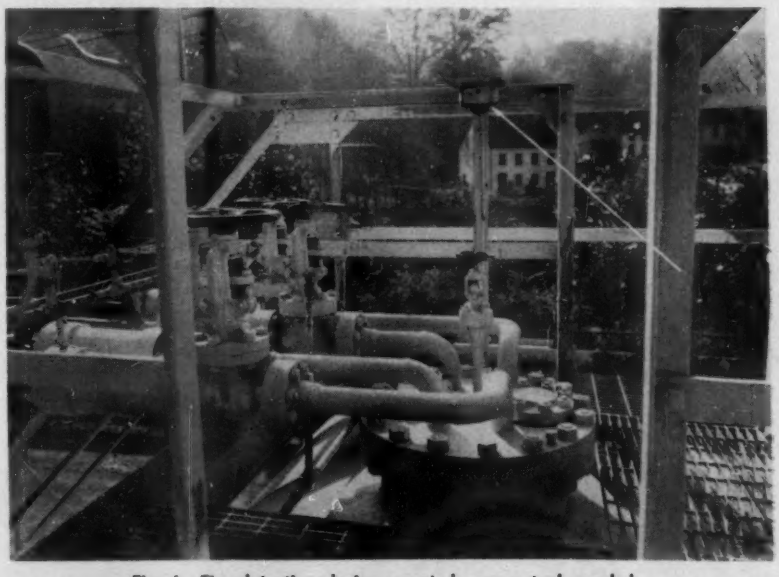


Fig. 6. Fire detection device mounted over a tank manhole.

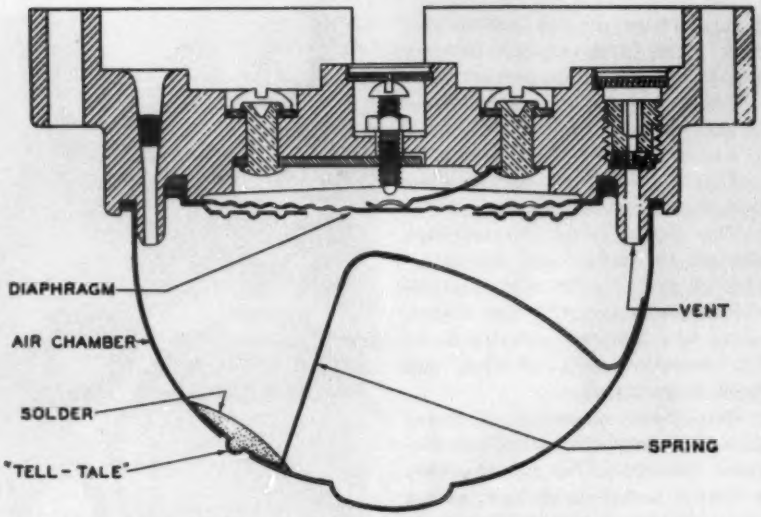


Fig. 7 (left). Close-up of fire detection device. Fig. 8 (right). Cross-section of fire detection device

sion for necessary expansion or contraction.

Hydraulic valves

The code states, in part, "If more than three storage containers discharge liquid into a manifold whose nominal diameter is greater than 2 in. and if the flow capacity of such manifold is less than the total discharge capacity of the discharge lines from the containers, one of the following for each container shall be provided:

"a. A remotely controlled external shutoff valve in combination with an excess flow valve.

"b. A remotely controlled quick closing valve which shall remain closed except during operating periods. The mechanism for such valves may be provided with a secondary control equipped with a fusible release (not over 220°F melting point), which will cause the quick closing valve to close automatically in case of fire."

In this installation each line coming from the tank is equipped with either an excess flow valve or a back pressure check valve. In addition, there is a manual globe valve and a hydraulic valve in the lines. *Fig. 11* shows a typical installation on top of each tank. The cylinder to the left of each globe valve is the hydraulic valve.

Fig. 12 shows a liquid outlet line from one of the tanks. The hydraulic valve is the flanged cylinder, to the right of the globe valve. The flanges have been taped to retard corrosion. The hydraulic oil line is shown here connected to the valve. The T-connection on the hydraulic line contains a fusible plug which melts at 165°F.

Fig. 13 is a cross section view of a 4-in. hydraulic valve. The valve is installed in the line with the internal mechanism pointing toward the tank outlet. Hydraulic oil pressure applied to the valve at the flange connection is forced to the spider channel, and up through a drilled tube in the center of the valve. The hydraulic oil, compressed in the chamber between the jam nut and the cap, forces the cylinder body to move upward, thus unseating or opening the valve. Hydraulic leakage between the piston and cylinder valves is prevented by "O" and cup rings.

When the hydraulic pressure is removed, the valve closes under the combined pressure of the L.P. gas and the operating spring. The spring tension normally holds the valve in the closed position.

The design of the hydraulic valve is such that tank pressure against a closed valve tends to seat the valve more securely; however, a pressure on the downstream side that is higher than the combined tank and operating spring pressure will open the valve and permit flow into the tank. This serves a useful purpose as will be explained later.

Since the valve is held open during operation by hydraulic pressure, the melting of the fusible plug in the oil line will release the oil pressure and permit the valve to close, thus shutting off the flow.

The five hydraulic valves on each tank are manifolded together, and are all operated simultaneously when hydraulic pressure is applied to the manifold. *Fig. 14* shows a schematic arrangement of the five hydraulic valves on each tank.

The hydraulic valves are opened by turning the three-way valve at C to permit carbon dioxide from the header to enter the pneumatic accumulator at H. The carbon dioxide expands a Buna N synthetic rubber separator bag, and forces the oil out of the accumulator and into the piston chambers of the valves, thus opening the valves. To close the valves, the three-way valve at C is turned and the trapped carbon dioxide pressure is released to the atmosphere, the hydraulic fluid returns to the accumulator and occupies the space left by the collapsing separator bag in the accumulator.

Fusible plugs are shown on the carbon dioxide header and beside each valve. The melting of any fusible plug on the oil line will release the oil from the five valves, automatically closing them. The

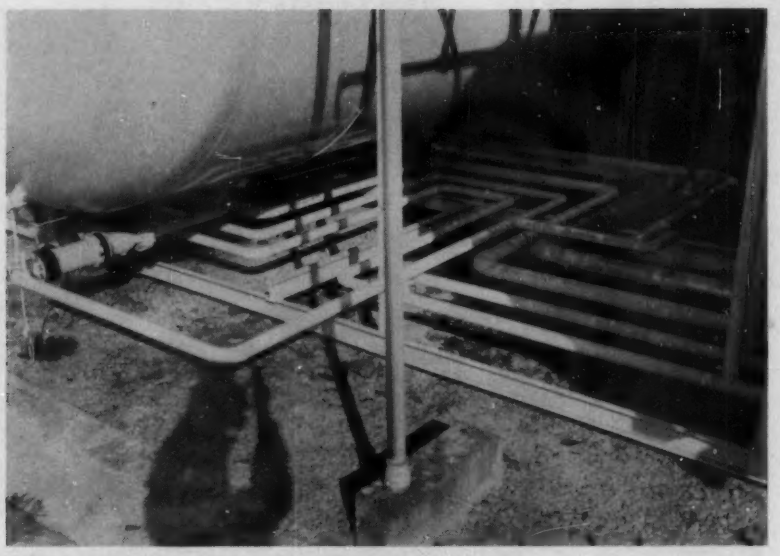


Fig. 9. Pipe expansion loops under the tanks.

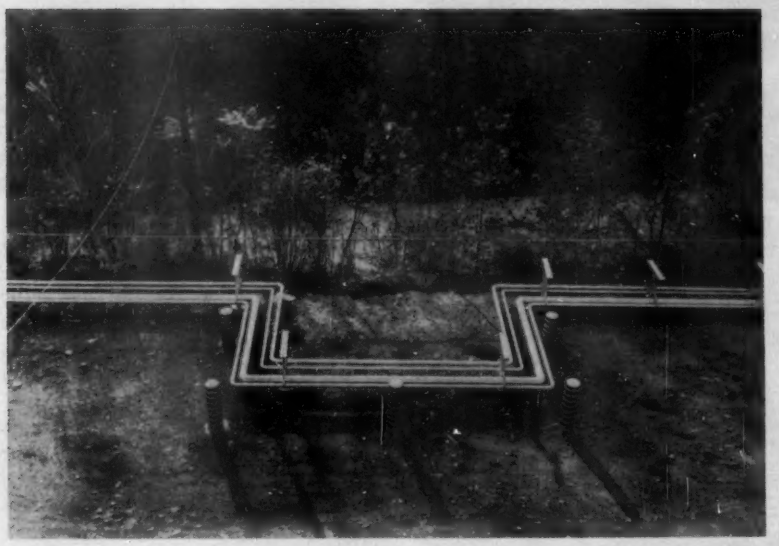


Fig. 10. Aerial view of expansion loops in LPG pipelines.

melting of a fusible plug on the carbon dioxide header will bleed the line and close all the hydraulic valves in the tank farm.

In this schematic, the five valves on the tank have been numbered to identify the lines from the tank. No. 1 is the liquid outlet, No. 2 is the vapor condensing inlet, No. 3 is the vapor outlet, No. 4 is the liquid fill and No. 5 is the pressurizing line.

Valve F is the filling point for the oil on the hydraulic system.

Fig. 15 shows the accumulator bag in three different positions. The left hand view is that of an empty accumulator, open to atmospheric pressure. The center view shows the bag fully distended

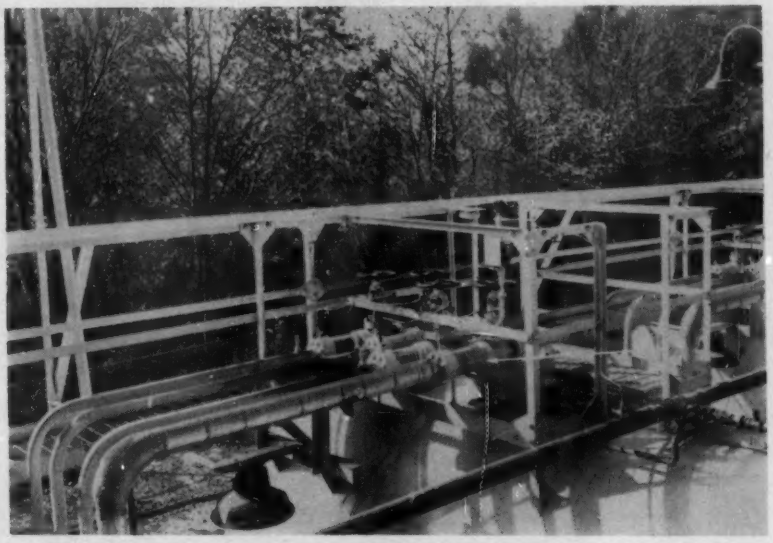


Fig. 11. Valving at tank manhole. Hydraulic valve is at left of each global valve.

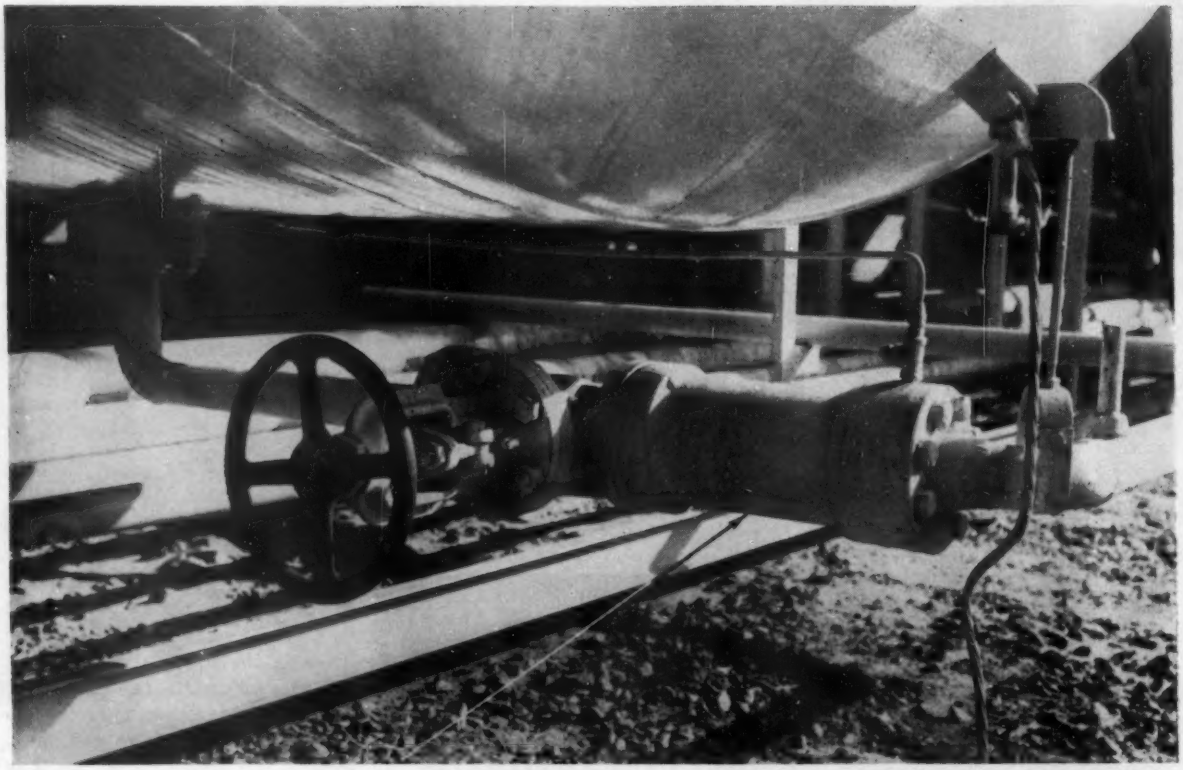


Fig. 12. The hydraulic valve in the liquid outlet line from a tank.

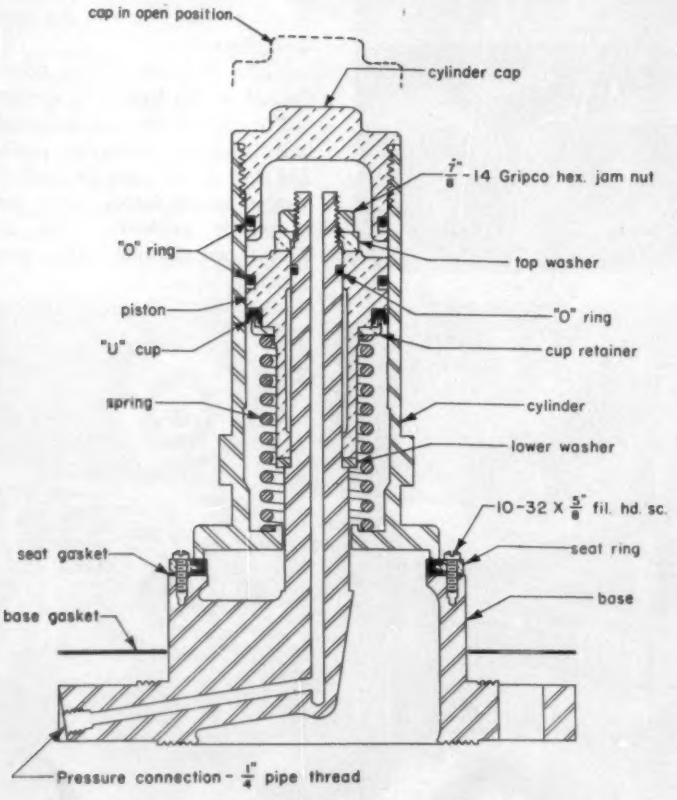


Fig. 13. Cross-section of a 4-in. hydraulic valve.

in operation. This would be the situation with not enough hydraulic oil. The right hand view shows the bag in an overcompressed state, which would indicate too much oil in the hydraulic system.

It will be noted that the poppet valve prevents the separator bag from being forced out of the accumulator when there is insufficient oil in the system.

The oil used in the hydraulic system is a refrigerator oil with a –40°F pour point.

Fig. 16 shows the basic schematic arrangement of feeding carbon dioxide to the operating manifold for the hydraulic accumulators. Special dry bottled CO_2 was used in this installation for pressurizing the accumulators as the distance of the farm from the main plant precluded the use of plant compressed air. The installation of an air compressor at the farm site was not feasible or economical.

To put the tanks into service, carbon dioxide pressure is regulated at R-1 and flows through a three-way valve at A, an electrically operated solenoid valve at S, to the main CO_2 header.

CO_2 pressure also goes through a three-way valve B, to a hydraulic accumulator at M. This opens the main liquid feed hydraulic valve to the plant vaporizers.

When the three-way valve C is opened on any tank, the tank accumulator is charged and all hydraulic valves on that particular tank are opened.

Fusible plugs throughout the system, when melted, will automatically shut down the farm on the CO_2 line, or shut down that particular tank if on the oil line. The farm also can be shut down manually by operating the trip valves T or with remote control by deenergizing the solenoid valve S.

On a normal shutdown valve C is turned to bleed CO_2 from the tank accumulator, then valve A is turned to bleed the manifold and the solenoid valve is closed.

This is the basic operation of the system. However, there are other features superimposed on this basic system.

In *Fig. 17* the dotted line shows the direct tie-in between the CO_2 bottles and the three-way valve B, through a regulator R-2. This enables only the 4-in. hydraulic valve to remain open under standby conditions, and allows the liquid piping to remain under gas holder pressure. When the tanks are in operation, valve B is turned so that the control of the 4-in. hydraulic valve is integrated with all of the other hydraulic valves.

Purge system

The dotted lines of *Fig. 18* show the components of the automatic purge system. If a fusible plug melts anywhere on the CO_2 header, this equipment is designed to drive the liquid propane back, out of the line and into the tanks, under CO_2 pressure.

Following the normal procedure to put the tank valves into service, the solenoid valve S is energized. Three-way valve A is turned to permit CO_2 to go to valve S. At this point CO_2 passes through both the ⅛-in. and 1/16-in. orifice plates. These restricting orifices are sized so that CO_2 pressure will be impressed on the bottom of the diaphragm of the differential governor W, before pressure is equal-

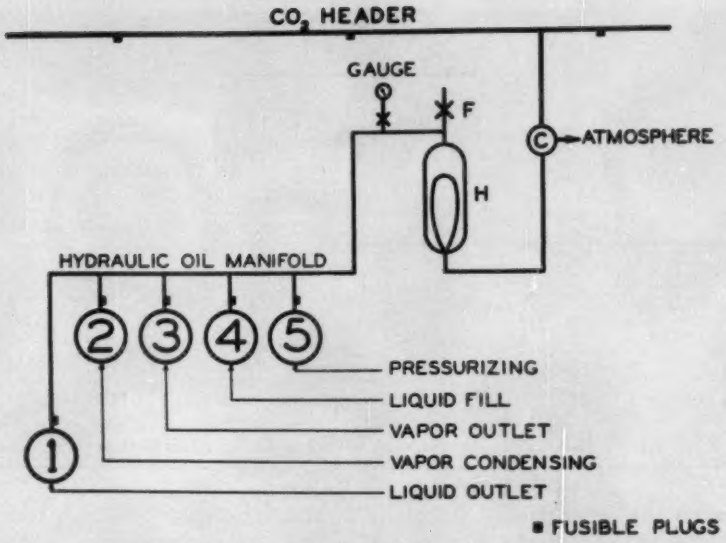


Fig. 14. Schematic arrangement of hydraulic valves on a tank.

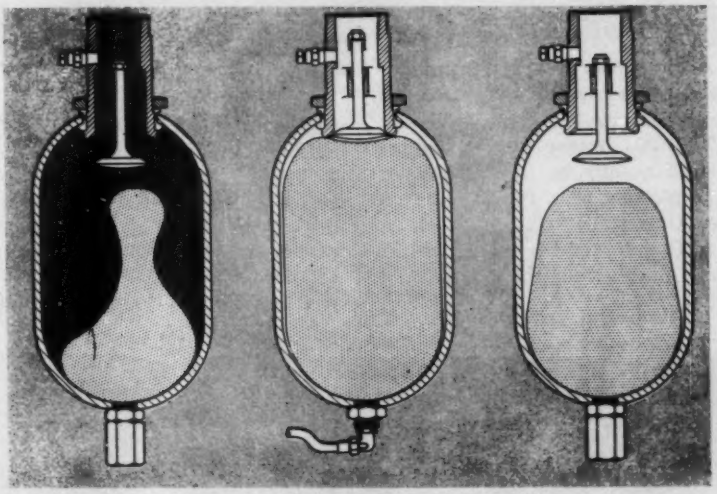


Fig. 15. Accumulator in operational stages.

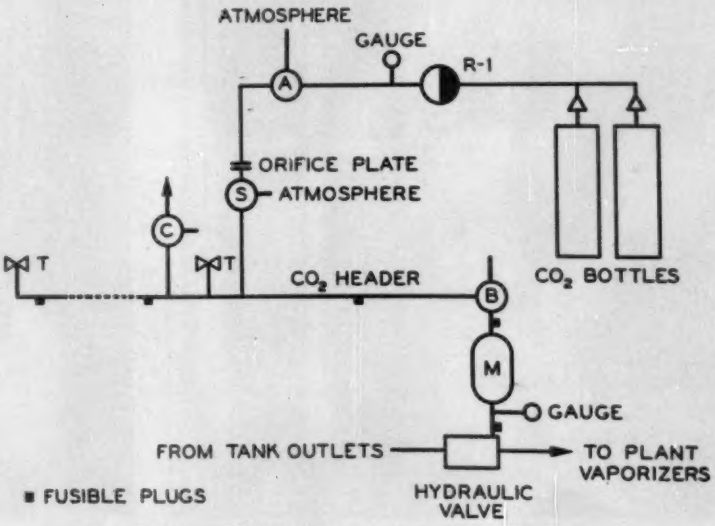
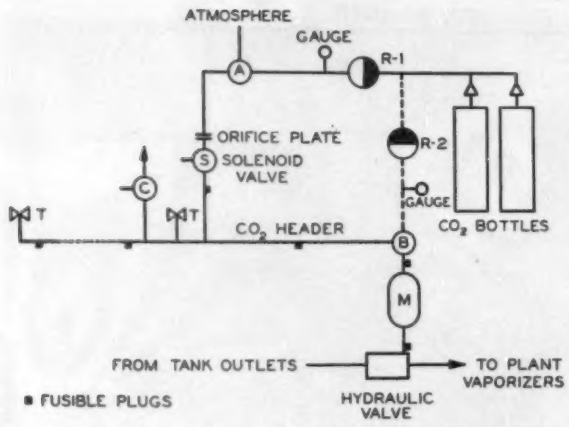


Fig. 16. Tank farm operation of the hydraulic valves.



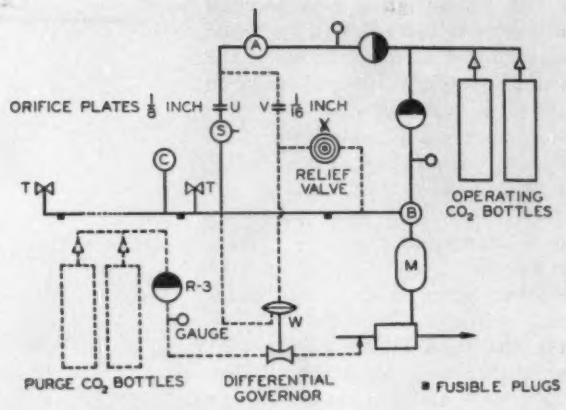


Fig. 17 (left). Standby operation of the hydraulic valves on tank farm. Fig. 18 (right). Schematic of purge piping.

ized on the upper part of the diaphragm. This governor is normally held closed by spring tension, and the stem moves down to open the valve.

After valves B and C are operated, the hydraulic valves are open and in service.

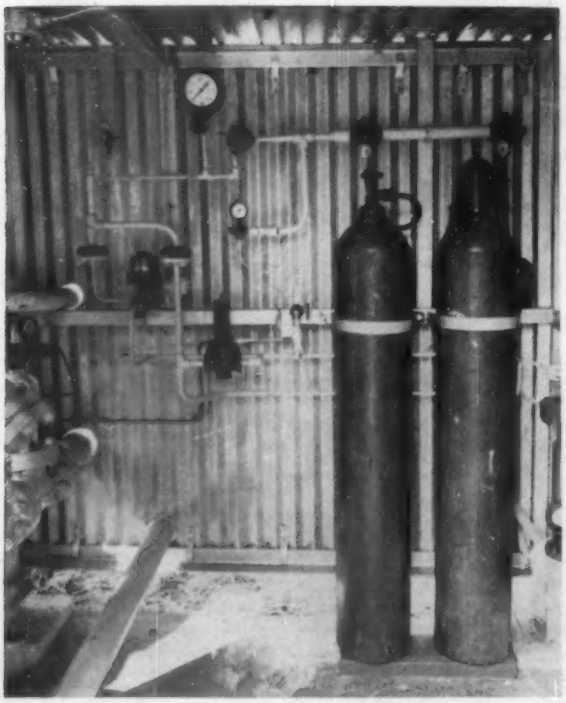
The CO_2 header can be depressurized rapidly by three methods:

1. Melting of a fusible plug on the CO_2 header.
2. Opening of the trip valves T.
3. Deenergizing the solenoid valve S.

If any one of these situations occurs during operation, all of the hydraulic valves close and an unbalance is set up on the differential governor W. The pressure on the bottom of the diaphragm is released, and the valve stem is forced down under the pressure coming through the 1/16-in. orifice. The governor valve opens and CO_2 enters the main liquid line. The main 4-in. hydraulic valve is closed and cannot be opened on the direction of normal flow. The CO_2 thus pushes the liquid through the liquid outlet lines and into the tank. Since this purge flow is counter to the normal flow, the 2-in. hydraulic valves will open against the operating spring pressure. A CO_2 pressure differential about 30 lb higher than tank pressure is sufficient. To assure efficient operation, a 250-lb pressure setting on R-3 is advisable.

The relief valve X is included on the system to prevent rupturing of the governor diaphragm. The setting on the relief valve is 100 lb.

Fig. 19 shows the physical ar-



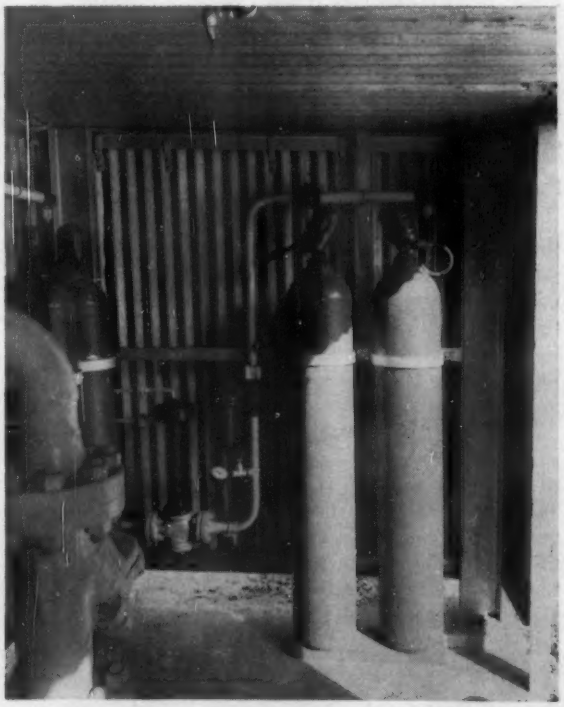


Fig. 19 (left). Carbon dioxide operating system. Fig. 20 (right). Carbon dioxide operating system.

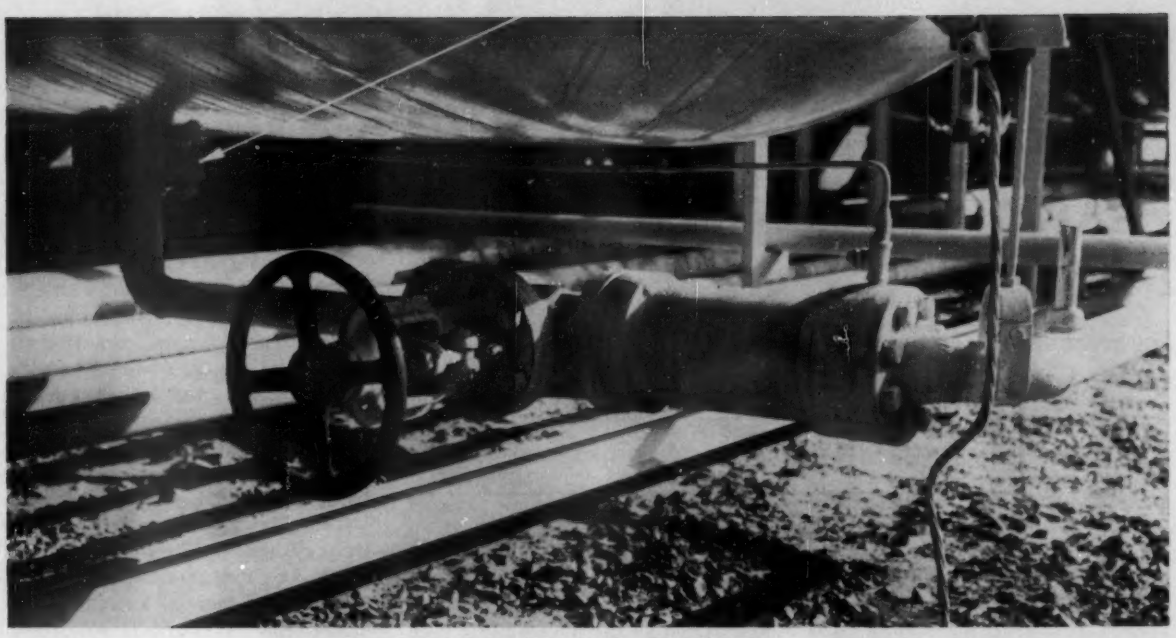


Fig. 21. Excess flow valve on liquid outlet line.

rangement of the equipment in the CO_2 operating system, while *Fig. 20* shows the fire purge equipment.

Excess flow valves

The most radical change in excess flow valve installation is in the liquid outlet line. The older method had the excess flow valve screwed externally into a socket welded on the tank shell. This method was susceptible to breakage of the valve by mechanical means or pipe strain.

Fig. 21 shows, at the left, the installation now in use.

Fig. 22 shows a cross section of the excess flow valve installation.

The installation in a flange makes the valve readily accessible for servicing. This provides complete inclosure and protection in the event of fire. The transfer of pipe strains is completely eliminated, since there is no direct connection between the external piping and the excess flow valve.

Flanges and gaskets

This installation was of all welded construction wherever possible. Three-hundred-pound flanges for use of Schedule 80 pipe were used throughout.

The code recommends the use of aluminum "O" ring and spiral wound metal asbestos gaskets. To avoid electrolytic reaction between dissimilar metals, spiral wound stainless steel asbestos gaskets were used. Before insertion each gasket face was coated with an insoluble plastic.

Electric control system

Fig. 23 shows the schematic wiring diagram of the control circuits between the tank farm and the control office.

Circuit No. 1 shown in solid lines is a combination circuit for the fire detection devices and a chasing circuit for detection of opens and shorts in the fire detection device circuit.

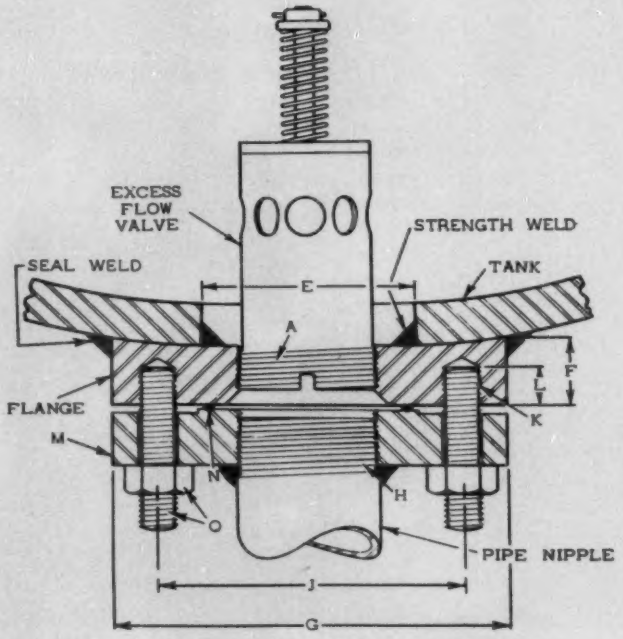


Fig. 22. Cross section of liquid outlet excess flow valve.

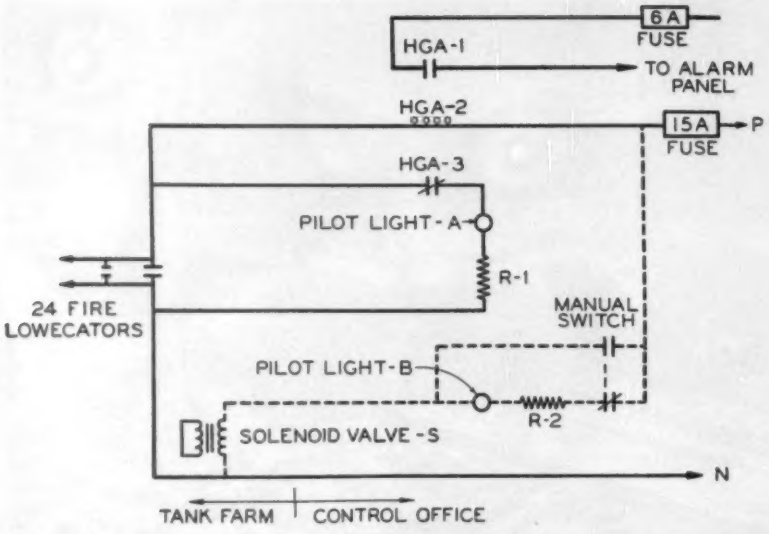


Fig. 23. Tank farm control circuit.

Current flows from P through a 15-amp fuse and through the coil of a relay at HGA-2. From HGA-2 the current flows to the fire detection devices and to a normally closed switch at HGA-3. Since the fire detection devices are normally open all the current passes through HGA-3. From HGA-3 the current flows through the pilot light A and a limiting resistor R-1 back to N, to complete the circuit.

In normal operation the pilot light A is lit and the HGA relay is deenergized, with only the pilot light current passing through the relay coil.

When one or more of the detection devices closes under the action of heat, full current flows through the coil of the relay at HGA-2. The relay closes, HGA-1 closes, and HGA-3 opens. Pilot light A goes out and an alarm rings on the alarm panel.

An open or short in this circuit will extinguish pilot light A.

Circuit No. 2, shown on dotted lines, controls the solenoid valve S.

As in circuit No. 1, the current flows from P through the 15-amp fuse to the manual switch. The current then flows through the closed side of the switch, the limiting resister R-2, the pilot light B, and the coil of the solenoid valve back to N, thus completing the circuit.

The pilot light current passing through the coil on the solenoid valve does not energize the valve.

When the manual switch is operated the full current energized the solenoid valve coil and the valve is opened. Pilot light B is extinguished.

Fig. 24 shows the manual control switch and the pilot lights. The top switch on the right hand panel is the control for actuating the solenoid valve. The left hand light above this switch is the solenoid valve circuit pilot, while the right hand light is the fire detection device pilot. The lights and toggle switches on the left hand panel are the alarm lights for the central plant control station. The bottom left pilot and toggle switch are for the No. 2 LPG tank farm.

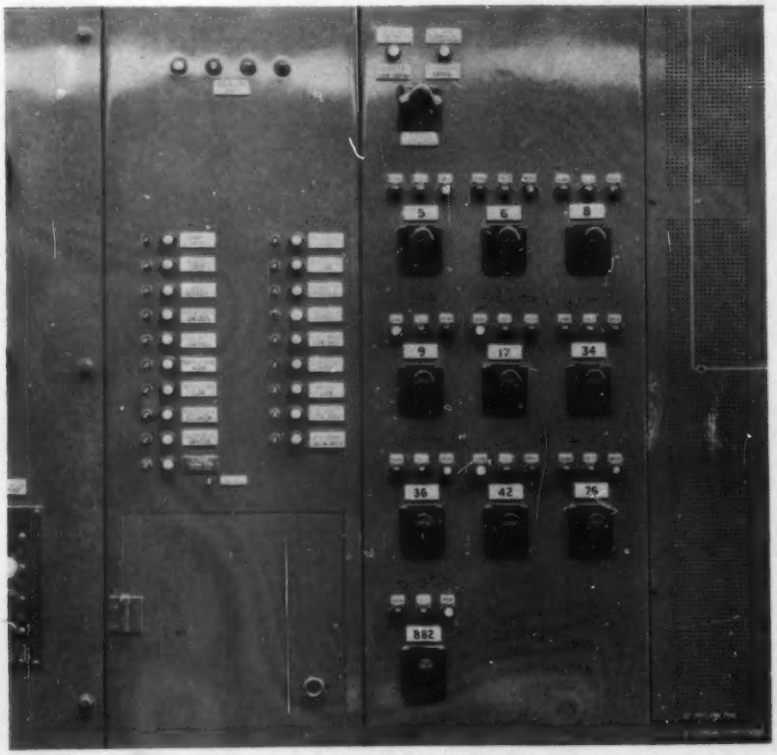


Fig. 24. Electrical controls for the LPG equipment.

In summary, the major changes involved in order to increase the safety of this installation were:

1. Relocation and increasing the number of safety valves.
2. Installation of a fire protection spray system.
3. Incorporation of a fire detection system.
4. Improvement of pipe expansion and flexibility.
5. Design and installation of a hydraulic valve system.
6. Addition of an automatic liquid line purge.
7. Insertion of liquid excess flow valve in a flange mounting.

These modifications show how the Philadelphia Electric Co. improved the safety standards of its LPG storage. Have you checked your storage safety standards? ■

Repair sealing bell and spigot joints with rubber base sealants

TODAY most large gas distributing companies throughout the country are converting from manufactured to natural gas because of its superior properties and lower price. This conversion has caused critical leakage problems at bell and spigot joints in gas lines which have been in service, in many cases, for as long as 60 years.

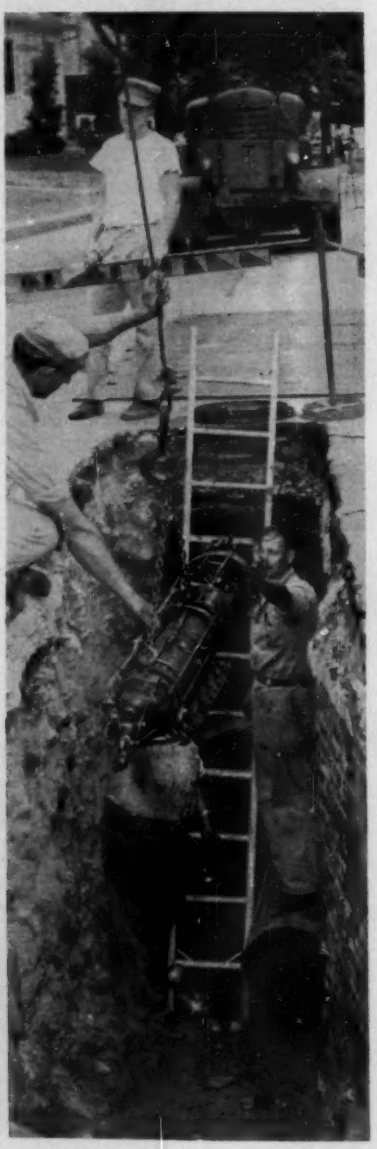
Absence of moisture in the natural gas has allowed shrinkage of the jute packing which had been previously maintained in a swelled condition by moisture in the manufactured gas. Leakage at some joints has been as much as 2.25 cfh. This leakage problem is aggravated by the necessity of increasing line pressures in order to meet increased demands.

As is often the case in modern industry, a product that solved a problem in another industry was applied to the problem of sealing gas main joints. Two-part sealers were originally developed for lining integral aircraft fuel tanks. The Adhesives, Coatings and Sealers division, Minnesota Mining & Manufacturing Co. (Detroit) decided to apply them to the gas industry joint problem. The two-part 3M sealers have excellent adhesion to cast iron, good flexibility and are impervious to compounds normally found in natural or manufactured gas lines.

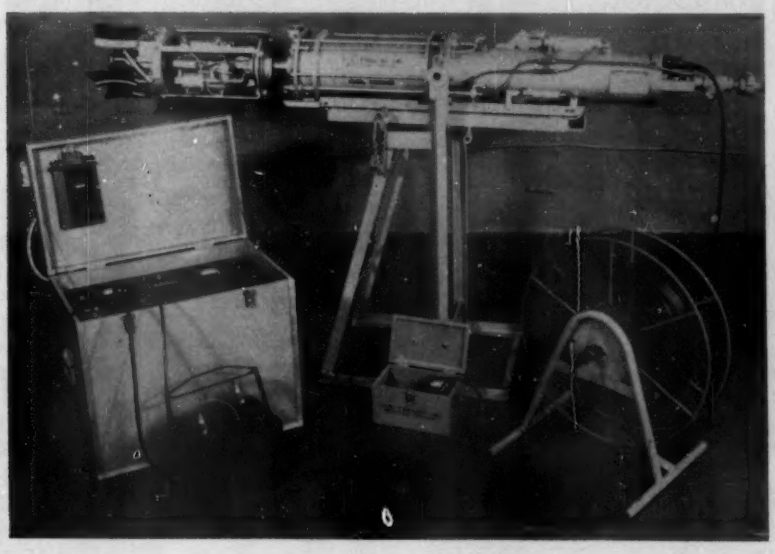
The rubber base sealers are heavy liquid synthetic rubber compounds which, upon the addition of an accelerator or catalyst, cure chemically to a tough, rubbery solid similar to a medium hardness synthetic rubber. Heat, pressure or accessibility to air are not required to effect a cure. This type of rubber base sealer is particularly noted for its long service life. It remains dimensionally stable through wide temperature ex-

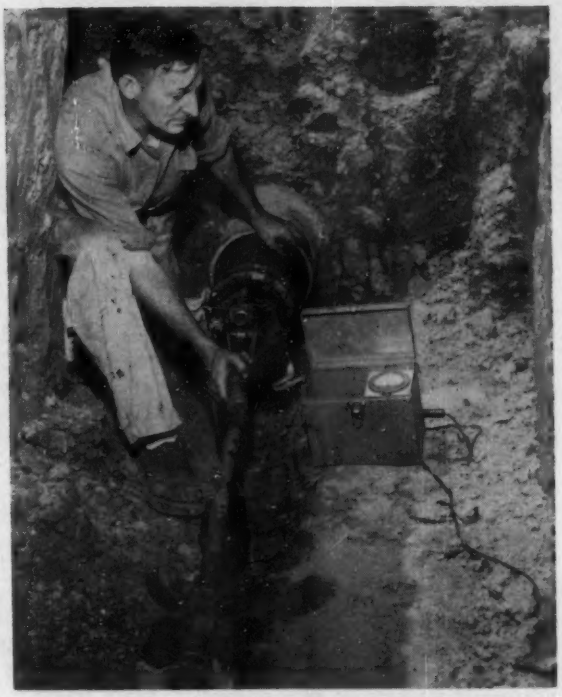
GAS exclusive

Sealing machine is lowered into ditch. After air and electrical connections are made, machine is placed in main for distance of 300 ft by air supply line.



Unique air operated machine internally seals bell and spigot joints. Applicator for applying sealant is at left end. Cylindrical section in center of machine is container for unmixed rubber base sealer and accelerator.





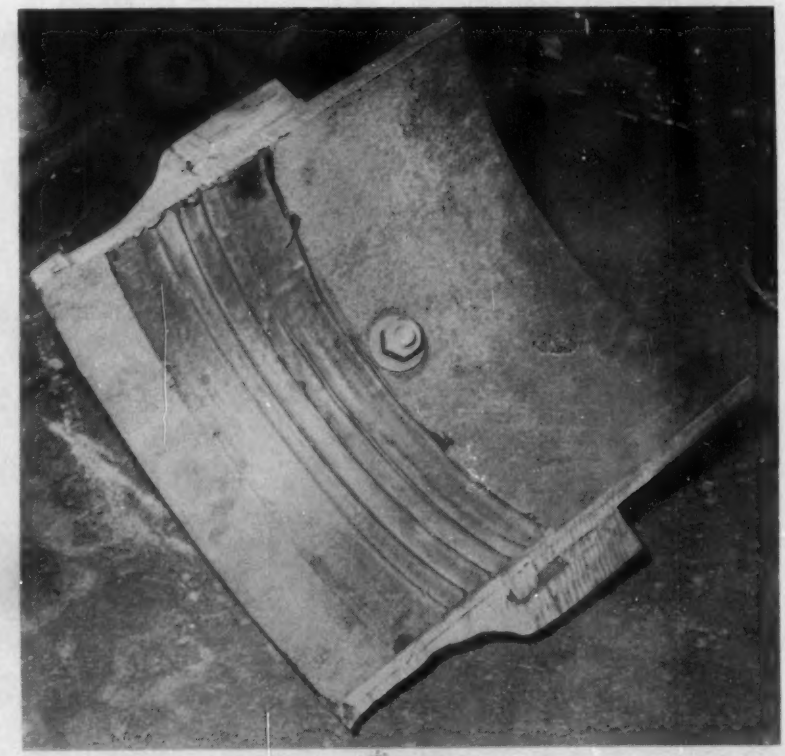
At left, sealer machine is pivoted into upright position to facilitate loading of sealer. Complete head is removed for sealer loading. After filling with sealer, accelerator is forced into another cylinder by means of pressure pot. At right, machine is being removed from gas main after all joints in a 300-ft section have been sealed. Machine, manually inserted is removed by air supply hose.

tremes. Flexibility and adhesion are retained at temperatures as low as —90°F. The tensile strength of this sealer when fully cured is in excess of 500 psig and has an ultimate elongation of 470 per cent.

To eliminate the difficulty and expense of digging holes every 12 ft and mechanically sealing bell and spigot joints, C. W. Fuelling Inc. (Decatur, Ind.) developed air-motor-operated machines which are inserted into gas mains and electronically locate, clean and apply sealer to each joint in main sections up to 600 ft long.

The machine is operated by compressed air which is controlled electrically through solenoid valves. The air supply pipe to the machine is also the means of inserting and removing the machine from the main. Two separate cylindrical reservoirs hold the unmixed sealer and accelerator.

To load the machine, the head containing the applicator paddles is removed and a special polyethylene sleeve containing the sealer is inserted into the cylinder. Accelerator is added to another



Cutaway gas main joint shows the excellent internal seal achieved by applying rubber base sealer with this unique machine.

special cylinder inside the machine by means of a hydraulic dispenser. The electromagnetic joint indicator is located on the underside of the machine. Machines that seal 8-, 10-, 12- and 16-in. diameter pipelines are in use.

For the internal sealing process, holes are dug at 600-ft intervals and an 8-ft section of the gas main is removed. The machine is then inserted into one end of the main for a distance of 300 ft by means of the air supply pipe. The machine is then gradually withdrawn. As the electromagnetic locator passes over a joint, a signal registers on a control panel. The machine is then moved a known distance from the point where the electromagnetic joint locator indicated the joint and the machine is in position for applying the sealer.

Before sealing operations begin, compressed air is ejected through jets to the joint surface, cleaning the area to be sealed. After this operation is completed, two air-powered pistons move upward against the inside surface of the main, locking the machine in place. An air motor then rotates four wiper blades on the paddle wheel applicator head. At this same instant, pistons force the 3M sealer and accelerator into the mixing chamber and eject it under pressure through four small vinyl-tipped pipes between the wiping blades. These rotating wiper blades are forced outward against the pipe walls, spreading the sealant into the joint space.

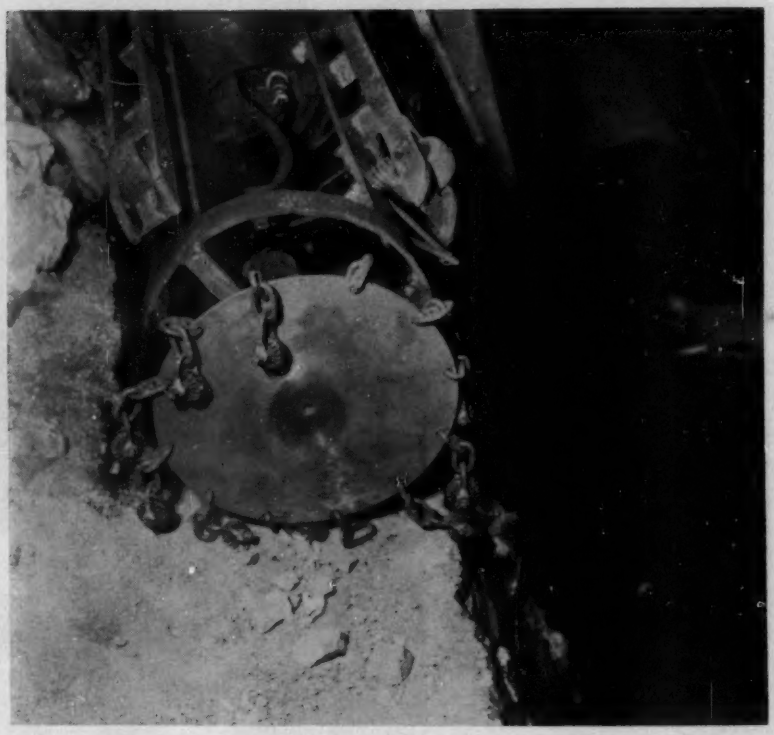
To insure that the proper amount of sealant is applied to the joints, the sealant piston travel is measured by a linear potentiometer and calibrated to read in cubic inches of sealer applied.

The paddles coat a surface approximately 6 in. wide on the inside circumference of the joints. When the first joint is completed, the machine is pulled back to the next joint, and so on, until all the joints in half of the 600-ft gas main are sealed. At this point, the machine is transferred to the other open end, and joints are sealed in the other half of the 600-ft section.

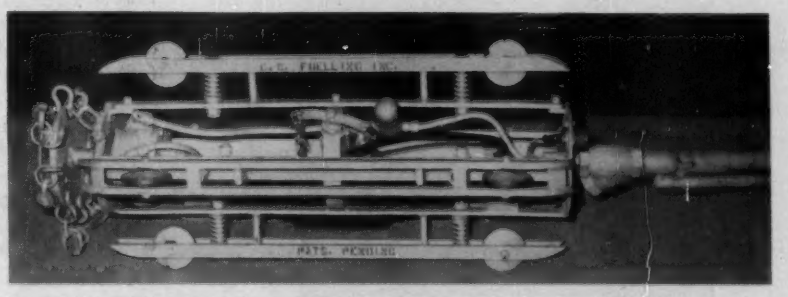
In many cases, gas mains contain foreign materials such as water, anti-leak liquids, dry gum, rust and scale that must be removed to insure proper sealing of the joint. For removing the liquid contaminants, a rubber squeegee is used to push or pull the foreign matter out of one of the open main ends. Rust, scale and other solid matter is removed by a special cleaning machine equipped with an electromagnetic joint locator. This machine first electrically locates the joint and then flails the inside of the joint with rotating hardened steel cutter blades, thus removing all solid matter. Air jets then remove the loosened particles from the joint area.

The sealing machine is designed for only comparatively straight lengths of pipe and will not go through plug valves or around bends. It will, however, travel through crosses or tees and ordinary deflections usually found in straight pipe lengths. Service tees or ordinary connections do not interfere with the machine operation.

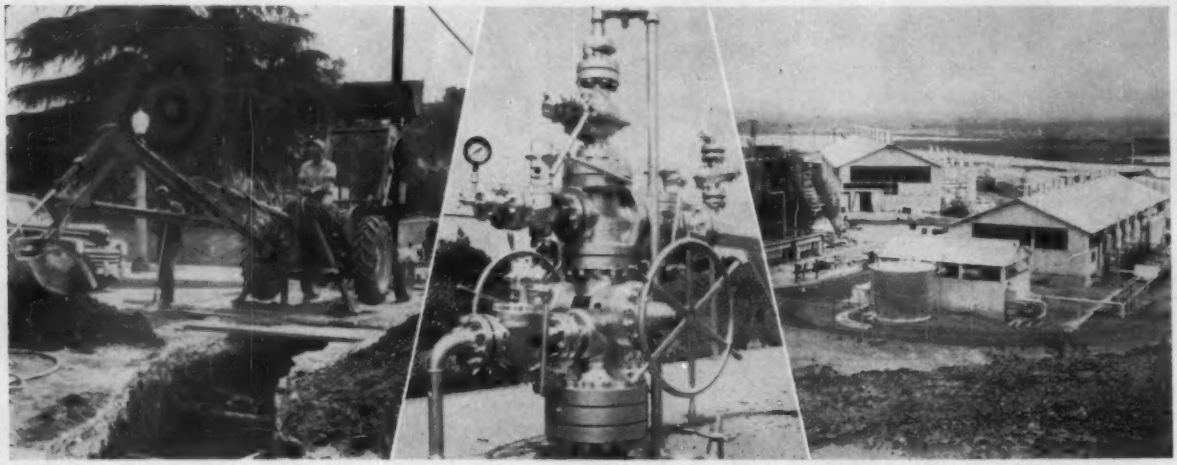
At the present time, the machine cannot be used in active gas mains but a machine is under design consideration that will operate on compressed gas instead of air and will enter the main from a chamber between two gate valves that will permit work on active mains. ■



Rotating wheel and hardened steel cutter blades of cleaning machine that flail the inside of gas main joints to remove solid matter.



Special cleaning machine electronically locates joints and removes rust, scale and other solid matter by flailing inside of joint with rotating hardened steel cutter blades. After particles of solid matter have been loosened, air jets remove particles from joint area.



Confident industry will continue record expansion

By ROBERT W. OTTO, President
American Gas Association

THE gas utility and pipeline industry, advancing to new heights on all fronts during 1957, is confidently building for the future because millions of Americans are depending on gas for present and future needs.

The industry is expressing its confidence in specific terms with current construction expenditures of $2 billion a year, 97 per cent of it earmarked for natural gas facilities. Expenditures will total $8.7 billion for a four-year period through 1960, compared with $5.3 billion spent in the previous four-year period (1953-56) and $4.7 billion in 1949-52.

Throughout the United States today the gas utility industry is providing service for 31 million customers in homes, business, industry, schools, churches, hospitals—in fact, everywhere where comfort, convenience, economy and dependability are essential. These customers receive our "wonder fuel" from approximately 1300 utility companies supplied by about 100 transmission companies. In addition, some 9 million consumers who live beyond the present reach of utility mains use "bottled gas."

- **Customers increase**

The average number of utility customers during 1957 was 30,385,700, an increase of 2.9 per cent over the 1956 average of 29,536,600. The year-end total was 30.9 million.

Utility customers receiving natural gas averaged 27.0 million during the past year, a gain of 1.8 million and an increase of 7 per cent over the 25.2 million natural gas customers served during 1956.

Manufactured and mixed gas customers averaged 3.2 million during 1957, for a decline of 21.2 per cent as former users of these fuels continued to convert to natural gas.

The total of gas utility customers is expected to increase steadily to an estimated 33.5 million—31 million of whom will be residential customers—on the average during 1960, and then to an average of 38.25 million by 1965, including 35.5 million residential users.

With gas replacing oil as the leading heating fuel for U. S. homes, house-heating customers of gas utilities now aggregate 18 million, an increase of 8 per cent over the previous year, and should approximate 20.5 million by the end of 1959. Gas-heated homes represented about 36 per cent of the nearly 50 million occupied homes and apartments as of mid-1957.

The industry's 18 million househeating customers represent 63 per cent of all residential gas consumers. A year earlier, with 16.7 million househeating customers, the proportion was 60 per cent.

• Sales, revenues

Total sales by the gas utility industry in 1957 climbed to a record high of 74.36 billion therms. This represented a gain of 2.0 per cent over the 72.9 billion therms sold in 1956.

Natural gas sales reached a new high of 72.02 billion therms, up 3.2 per cent over the 69.8 billion sold a year earlier. Manufactured and mixed gas sales aggregated 2.28 billion therms, dropping 25.2 per cent from last year to reflect the increasing conversion to natural gas.

Revenues from gas utility and pipeline sales to ultimate consumers advanced to an all-time high of $4,014,000,000, a gain of 4.2 per cent over the previous record of $3,853,000,000 a year earlier. Natural gas revenues increased 7.4 per cent to $3,676,000,000, compared with the 1956 record of $3,422,000,000. Manufactured and mixed gas revenues were $322 million, a drop of 22 per cent from $412 million in 1956.

• Natural gas reserves

Proved recoverable reserves of natural gas reached an all-time high of 237.8 trillion cu ft at the start of 1957. Even though net production climbed to a record of 10.9 trillion cu ft in 1956, a net increase of 14.1 trillion cu ft was attained through new discoveries and other reserve additions totaling 25 trillion cu ft. During the past decade, additions to reserves have been twice as great as the amount of gas produced.

Ultimate recoverable reserves in the United States alone (not taking the potential sources of supply in Canada and Mexico into account) have been estimated by the U. S. Bureau of Mines at approximately 1000 trillion cu ft, while a recent study by the Chase Manhattan Bank estimates a minimum supply of 1200 trillion.

Natural gas reserves are concentrated in six states —Texas, Louisiana, New Mexico, Kansas, Oklahoma and California—which have combined reserves of 221.5 trillion cu ft, or 93 per cent of the U. S. total.

• Underground storage, pipelines

In order to permit greater year-round utilization of pipeline capacities and facilitate sales by distributing companies to consumers for heating use, our industry is rapidly increasing its underground storage facilities.

At the beginning of 1957, there were 188 underground storage pools and 7432 wells in operation in 20 states, primarily in the Middle Atlantic and East North Central areas, with an ultimate capacity of 3.4 trillion cu ft.

The amount of gas actually in storage reached a new high of 1.5 trillion cu ft at the end of 1956, with a maximum daily output of 8 billion cu ft. It was estimated that underground storage facilities represented 20 per cent of the industry's total requirements for its biggest demand day of the year.

Total capital investment in underground storage fields in 1956 reached $443 million, up from $395 million a year earlier. The industry spent an additional $54 million for such facilities during the past year.

Moving gas from the wellhead to the burner tip requires an intricate network of pipelines stretching to every corner of the country. Approximately 21,000 miles of mains were added in 1957 to bring the total mileage to 545,700. The gas industry has extended its mains some 200,000 miles in the past 10 years, and within the next 10 years the pipeline network is expected to spread to more than three-quarters of a million miles.

• Gas appliances and equipment

The gas industry doubled its research, development and promotion activities in the field of gas air conditioning in 1957. The AGA research program set its sights on at least three experimental units for demonstration to interested manufacturers by the end of the year. Two units—the Swiss open-cycle sorption system and the improved adsorption system, were demonstrated late in the year. The free piston engine-compressor unit will be shown early in 1958.

Our industry also displayed keen interest and strong support for Arkansas Louisiana Gas Co.'s acquisition of the air conditioning holdings of Servel Inc. This utility company set a goal of 4600 residential direct-fired absorption units in its first year of operation. Because of assurances given by other utility companies in recent weeks, this quota has been raised to 7000 units.

When Servel discontinued making gas refrigerators at mid-year, several major appliance manufacturers immediately entered the picture as potential successors in this field. It has just been announced that RCA-Whirlpool has bought the refrigerator properties of Servel.

Shipments of gas appliances and equipment were below the near-record volume of 1956, principally due to a general decline in housing activity and family formations, but manufacturers anticipate an upturn during 1958.

Although gas ranges as a whole were somewhat under 1956 volume, built-in ranges made substantial gains and partially offset a drop in sales of free-standing ranges. Built-ins, gaining at the rate of about 40,000 units a year, now account for slightly more than 10 per cent of the gas range market.

• AGA laboratories

Approximately 5000 gas appliances and accessories were received by AGA Laboratories for approval tests in 1957. The majority of these were approved as complying with the industry's stringent standards of performance and were authorized to display the registered Approved Seal or Listing Symbol. Appliances with the Approval Seal—familiarly known as the Blue Star—continued to receive wide consumer acceptance because of their tested safety, durability and performance.

Most of the approved appliances and accessory designs incorporated advanced styling, improved performance and added convenience features. Over 50 per cent of the units approved were designed for comfort heating, the designs stressing compactness and performance. Approval testing of smokeless, odorless type domestic gas incinerators were initiated late in the year.

Laboratories inspectors traveled some 150,000 miles in visiting more than 600 points of production in the United States and Canada. They made announced inspections for the purpose of renewal of certification and unannounced inspections of approved units to assure conformance of production in line with the model tested. Quality-control performance checks at point of production were also continued on a large scale.

Nineteen revised standards for appliances and accessories were adopted to become effective at the beginning of 1958. These included provisions upgrading gas equipment and provisions for approval testing of cooking appliances incorporating automatic top burner control. They also included a standard for gas incinerators.

Domestic, industrial and commercial research activities continued at a high level with 18 projects under study.

• Promotion, advertising, research

The American Gas Association's highly successful Promotion, Advertising and Research (PAR) Plan completed its 13th year of coordinated activities embracing promotion, advertising, utility company research, pipeline research, and public information. Utility and pipeline companies subscribed more than $3.25 million to PAR, which has increased its 1958 budget by another half million dollars to widen and accelerate its multiple activities.

Among the many successful PAR operations was the industry's first use of national television as a sponsor of award-winning "Playhouse 90" on CBS. It is estimated that Julia Meade's messages on modern gas appliances are reaching 11 to 14 million homes each week on "Playhouse 90," which consistently rates among the top 10 national TV network programs. More than $2.5 million was subscribed in 1957 by gas utilities, transmission companies and manufacturers to support the industry's television program. The television budget for 1958 has been increased to nearly $3 million, which is in addition to subscriptions to the PAR Plan.

The national advertising program of PAR in 1957 scheduled $1.25 million in ads appearing in magazines of general and specialized fields with total circulation of nearly 40 million and estimated total sales messages of over 200 million. Many major manufacturers cooperated with the gas industry in space-sharing advertising.

Major promotion achievements included a record-breaking "White Christmas" promotion featuring Bing Crosby, The Mrs. America Contest (the 1957 winner was Mrs. Linwood Findley of Arlington, Va.) sponsored by AGA for the fifth year, nationwide activities of the New Freedom Gas Kitchen and Laundry Bureau, extensive gas appliance tie-ins with motion pictures and television, merchandising aids, educational campaigns, and many similar projects to expand the appliance market and the gas industry in general.

The PAR public information program continued to expand its activities to promote public relations for the entire industry. Major emphasis was placed on investor relations, employee recruitment, telling the facts on government in gas, a series of regional workshops, a national publicity program favorable to gas, and greater stimulation of coordinated local PAR action. The first annual AGA Public Relations Achievement Award was won by the Southern California Gas Co. for its "Facts About Natural Gas" program.

PAR-financed research activities made notable advances in all fields, particularly in gas air conditioning and domestic incinerators. Gas operations research emphasized production of natural gas substitutes, with the synthesis gas-methanization process for production of pipeline gas from coal being successfully integrated in pilot plant operation. Pipeline research concentrated on improved pipeline design and operation. Twenty-two new research projects were initiated during 1957, 54 were continued from the previous year and 19 were concluded. ■

$5 billion appliance market predicted for 1958

By CLIFFORD V. COONS, President
Gas Appliance Manufacturers Association

THE residential gas appliance and equipment industry estimates that at least 15.6 per cent of the $32 billion outlay expected in 1958 for new home construction and modernization will be spent on kitchen, laundry and heating equipment, with gas-operated types in greater demand than at any time in the past.

A better than seasonal pick-up in the gas heating business since last summer, continuation of heavy volume in gas water heaters, and a sharp final-quarter rise in sales of gas built-in ranges are among the reasons why the industry's outlook for the new year is extremely bright.

Official forecasts of 1.1 million housing starts valued at $17 billion and home improvement projects totaling $15 billion are another basis for gas equipment industry enthusiasm.

It appears likely that housing starts will be better distributed in 1958 than during this year when Los Angeles alone accounted for every 12th start. This will mean better distribution of business among regional equipment producers.

The average new home, according to recent past performances, will retail for about $15,500 and will require about $1,850 worth of cooking, heating, laundering and related equipment. In cases of home improvement, 20 per cent of the average budget will go for similar equipment.

The combination of the new homes and modernization markets therefore will involve an equipment expenditure by consumers of more than $5 billion, or 15.6 per cent, of the $32 billion earmarked for shelter production and improvement in 1958.

Recent figures show how the gas industry ties into the present and future housing picture. Seven out of 10 new homes now are being equipped with gas central heating furnaces or boilers. Gas water heaters are outselling other types by better than three to one, while sales of gas built-in ranges, now in demand for both new homes and replacement projects, are up nearly 20 per cent over last year's total and are expected to go much higher in 1958.

Even if only 10 per cent of the nation's existing homes come in for some improvement next year—and the outlook is for a much larger number, according to building and loan and other lending institutions—the effect on appliance sales is likely to be positive.

The tendency to favor gas equipment is already discernible in the step-up of gas conversion burner, clothes dryer, direct heating equipment, gas range and water heater sales during the final quarter of 1957, as well as the all-year pace of furnace and boiler sales.

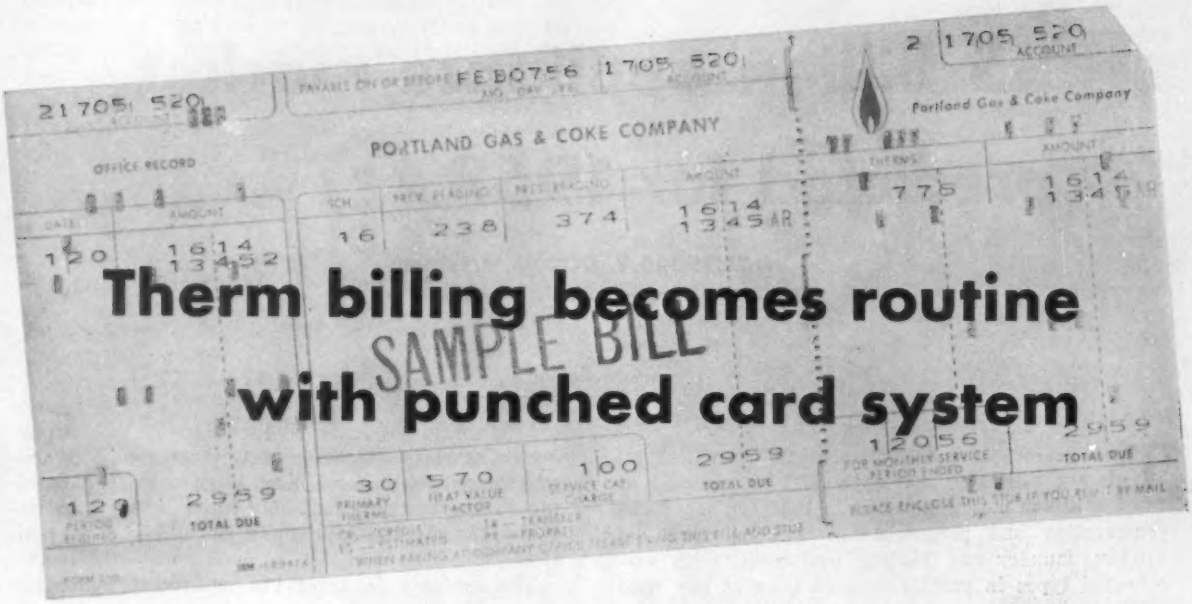
Demand for gas dryers indicates that home improvers want to complete laundry automation that began with earlier installation of washing machines. Automatic gas water heaters figure in modernization projects because of growing families, the need for increased hot water-producing capacity, and the fact that new and improved components of the modern gas heater have added to its efficiency without increasing its bulk.

As to gas ranges, either free-standing or built-in, dealers report demand arising from a swing to the new time and automatic heat controls for both the oven and range top burners and a realization, at long last, of how much easier it is to run a kitchen equipped with efficient cooking automation.

Students of the modernization market also see updated refrigeration and whole-house air conditioning as in more common demand in 1958. Both services are now available in gas-operated equipment, and the new year is expected to see more gas equipment companies engaged in this phase of the industry.

The continuing spectacular expansion of the natural gas pipeline system is a strong indication of the industry's belief that our expanding population will demand gas and gas burning appliances and equipment in increasing volume. And the entire industry —producers, pipeliners, utility companies and manufacturers of gas appliances and equipment are united in support of programs that will not merely maintain the industry's leadership, but will expand its service to the nation's homes and stimulate the sale of gas and gas equipment. ■

GAS exclusive



Therm billing becomes routine with punched card system

By CECIL V. GRIFFITH, Treasurer and Controller,

Portland (Ore.) Gas & Coke Co.

Key to making therm billing mechanically simple is this calculator. At lightning speeds, it automatically extends billing amounts, multiplying therm factors by actual usage in hundreds of cu ft.

FOR a gas company, a major shift in type of service, such as we have undergone at the Portland (Ore.) Gas & Coke Co., calls for something of a chain reaction of changes throughout the administration of the company.

The basic change at Portland Gas, of course, was the arrival of natural gas service in the Northwest in September, 1956. Now, slightly more than a year after the introduction of natural gas into our system, we are:

Selling more gas to new industrial users than we had formerly marketed through our entire manufactured gas system.

Serving 9500 new heating customers.

Providing gas to our expanded list of spaceheating customers for an average of 23 per cent less than it formerly cost them.

Handling our consumer billing —including this greatly expanded workload—more efficiently and in less working time than was required before we began our natural gas planning.

FIRST OF A SERIES OF **DATA SHEETS** REMOVE AND RETAIN

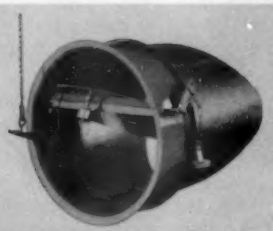
NEW: THE DRAFT CONTROL THAT SERVES ALL FUELS

The Field Triple-Fuel M+MG2

APPLICATION DATA: A triple-fuel draft control, designed for oil, oil-gas, gas, and coal-fired furnaces and boilers with 10″ through 32″ outlets, either natural, induced, or forced draft.

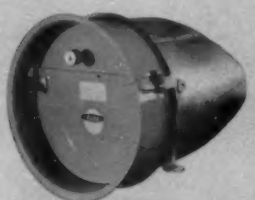
DESIGN DATA. The M+MG2 is a precision-made, three-fuel control. Because it is a control of extreme sensitivity, it is, of necessity, a control of extreme structural strength. For example, accuracy is increased when the clearance between a ring and gate is held to a minimum. To permit this, in the M + MG2, without risk of binding, Field developed a die-formed, heavy gauge ring that is the strongest ever offered on a draft control. Its deflection strength exceeds many fold the normal requirements of shipping, installation or use. The gate is also the heaviest made — 39 pounds for a 32 inch control. Such weight obviously provides extreme rigidity. Heavy weight is also, paradoxically, a requirement of the virtually friction-free mounting that gives the M + MG2 its extreme sensitivity. Only a heavy gate could be so delicately balanced. The same weight factor also prevents the spurious responses to which so sensitive a gate might normally be subject.

The M + MG2 gate is mounted on a long, thin, stainless steel knife edge, which in turn rests on self-aligning bearings. The bearings are self-cleaning. Soot or dirt cannot accumulate to cause binding or friction. They are also self-levelling — assuring that the knife edge is always in contact across the full width of the bearing, for an even distribution of weight. When the gate moves, only the sharp corner of the knife edge rests on the bear-

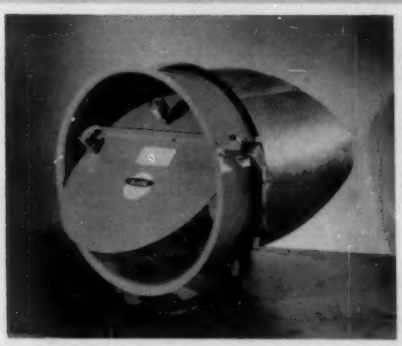


M+MG2 Barochek for Solid Fuels

A triple-fuel control, the M+MG2 requires only minor, on-the-job changes to handle different fuels. Fuel conversions cannot obsolete this control.



M+MG2 Single-Acting for Oil



M+MG2 Double-Acting for Gas

Perforated for easy tear-out. *Remove and file for reference.*

The Field Type M+MG2

ings — an area of contact so minute that friction is virtually non-existent. The result is extreme and instantaneous sensitivity to draft change. The gate is deeply recessed in the ring, to direct the flow of air over the gate and avoid response to random, variable air conditions outside the control.

The M + MG2 permits an unusually wide range of draft settings. The 18″ control, for example will maintain a draft setting as low as .002″. The same control will maintain a draft as high as .35″, a requirement where there is a very high draft loss through the appliance. Compensation for differences between horizontal and vertical installation is fully provided, by the simplest means available on any Field control. Where a safety switch must be specified, to meet gas code requirements, attachment is easily, effectively, and compactly made. Compactness is a characteristic of the M + MG2. There are no protruding parts. Even the stainless steel bead chain is short, holding setting weights neatly against the side of the control.

The M + MG2 is a heavy control, and it is strong to a degree even beyond what its weight implies. For actual weights, sizes and other data, see the table below.

Data Sheet No. 2 will cover Application Engineering.

PHYSICAL DATA

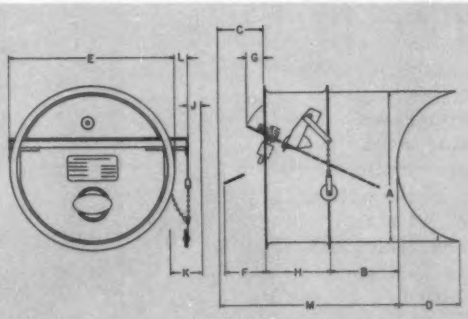
Control Size	Nominal Capacity Sq. In.	Recom. Pipe Sizes Dia.	Recom. Pipe Sizes Circum.	A	B	C	D	E	F	G	H	J	K	L	M	Shpg. Wt. Comp.	Shpg. Wt. L.C.	Vol. (Cu. Ft.) Comp.	Vol. (Cu. Ft.) L.C.
10	78.5	9 & 10	28¼ to 31½	10	4⅜	10	4¼	11	3⅜	1⅛	4¾	1	3½	1	19⅛	9½ #	7½ #	.76	.49
12	113	11 & 12	34½ to 37¾	12	5¼	12	5	13¼	4⅜	1¾	4¾	1	3½	⅞	22½	11½ #	8½ #	1.32	.70
14	154	13 & 14	40¾ to 44	14	7⅛	14	5¾	15½	5⅜	2⅛	5⅜	1	3½	⅝	26¼	17 #	11 #	2.12	1.03
16	201	15 & 16	47 to 50¼	16	8⅜	16	6½	17½	6⅜	2⅜	5⅝	1½	4	⅝	30	28 #	17¾ #	3.1	1.41
18	255	17 & 18	53½ to 56½	18	8¼	18	7½	19½	6⅞	2¾	7⅜	1½	5¼	1⅜	33⅛	34 #	22½ #	3.98	2.09
20	314	19 to 21	59¾ to 66	20	9⅜	20	8⅛	22	7⅜	3	7¾	1½	6¼	1¼	37⅜	42½ #	28¼ #	5.85	2.90
24	452	22 to 25	69 to 78½	24	12⅜	24	10½	26	9¼	3⅜	8⅝	2	6¼	1¼	45¼	65 #	44 #	7.18	4.35
28	616	26 to 30	81¾ to 94¼	28	13⅛	28	*	30½	10¾	4⅛	11⅜	2	6¼	⅞	52½	95 #	69 #	7.80	7.80
32	804	31 to 34	97½ to 107	32	15⅛	32	*	35	12¼	4¾	12⅛	2	6¼	⅛	59½	123 #	89 #	12.20	12.20

*No Points On These Collars

MATERIAL GAUGES

Size	Ring	Gate	Collar
10	20	18	24*
12	20	16	24*
14	20	16	22*
16	18	16	18*
18	18	16	18*
20	18	16	18*
24	18	14	18*
28	16	14	14**
32	16	14	14**

*Galvanized **H.R.P.O. with Enamel Finish



FIELD CONTROL DIVISION

H. D. Conkey & Company, Mendota, Illinois

AFFILIATES:
Conco Building Products, Inc. • Brisk, Tile, Stone — Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 10, Ont., Canada

field

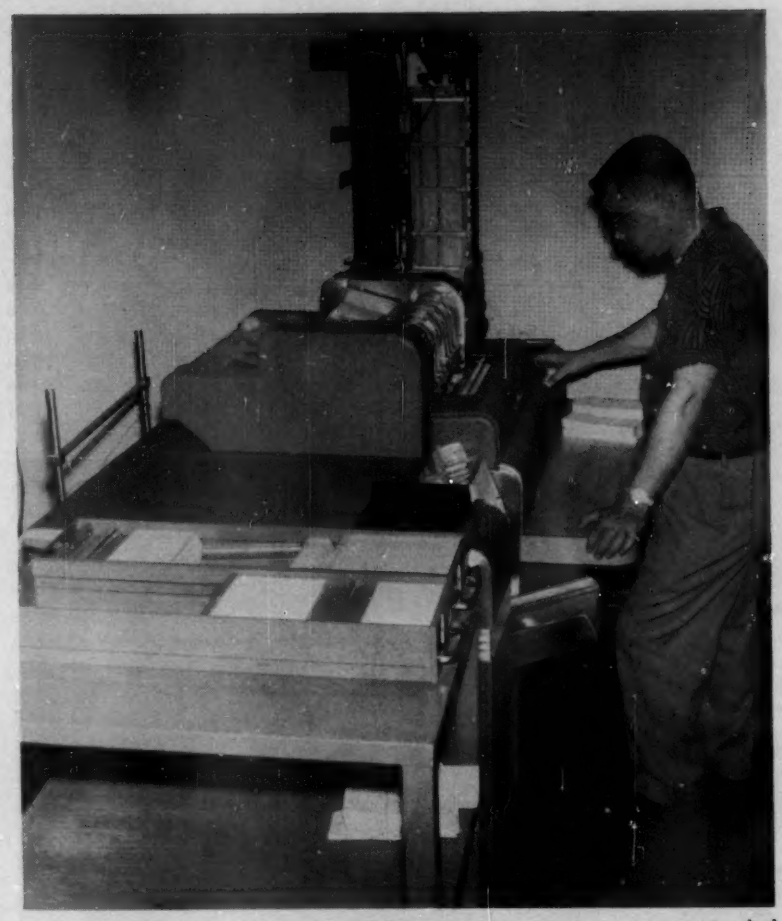
The consumer billing aspects of our changeover, we feel, may be of particular interest to other gas utilities because our situation necessitated that Portland Gas become a leader in converting the billing of our nearly 90,000 accounts to a therm basis.

As with pipeline and plant construction details, planning for the accounting phases of our conversion required years of advance preparation. At the time we entered into our natural gas commitments, we were billing our consumers with manually operated bookkeeping machines. We, of course, knew immediately that punched card accounting would become an eventual necessity if we were to economically sell gas purchased on a variable Btu basis. Our initial commitments with IBM for the needed equipment actually pre-dated the entry of natural gas into our system by more than three years.

We made what we recognized to be heavy investments in advance study and planning for the introduction of punched card accounting. Subsequent events, however, have convinced us completely of the soundness of thorough advance preparation in terms of:

Consumer acceptance. With all the publicity and fanfare given to the change-over to natural gas, we felt it desirable to avoid any possible confusion which might result from changing our billing methods at the same time as we switched our fuel.

Employee indoctrination. Putting in punched card accounting in advance of the fuel change-over kept the impact on our own staff —in terms of administrative and procedural changes—within easily controllable limits at all times. By working well in advance, we were able to set a pace which kept employee morale very much in our favor. In the accounting conversion, we were able to adopt a policy under which all operators of our new IBM equipment were established employees for whom the company underwrote special job training. The only "outside" person brought in with the accounting change-over was our IBM supervisor, Robert Jory. For the most part, however, interdepartmental dealings after the conversion to the IBM system were among the same people as before. This paid really handsome dividends in all-around cooperation.



This accounting machine prepares Portland Gas' post card consumer statements. Punched card bills also have self-justifying payment stubs.

Following through with our theory on the advantages of advance preparation, our IBM supervisor, Mr. Jory, came to work for Portland Gas approximately a year before any punched card accounting equipment was delivered. This gave both him and the company a running headstart. It was during this period prior to the delivery of our IBM equipment that the necessary close working relationship was established between Mr. Jory and Frank Reverman, supervisor of all of our company's bookkeeping operations. The close teamwork which was set up then and has existed uninterrupted between these two men—the one an expert on machine accounting, the other highly experienced in utility company operations—has been one of the important keys to the success of the accounting phases of our company's conversions.

During the months before our IBM equipment was delivered, our accounting specialists were able to work out virtually every important plan and program needed to assure its success. IBM procedures and machine setups were worked out to the last wiring panel. More important, all affected personnel were completely briefed and pre-trained.

For example, a series of meetings was arranged between accounting personnel and meter readers to set up the procedures for the change-over to IBM's mark sense meter reading system. The men on the job actually made a number of valid working contri-

butions to the procedures manual under which they now operate. Once the IBM system was explained to them, the meter readers were able to make some valuable contributions in connection with the design of the meter reading cards and the coding of working instructions. The main point, however, was that the people actually doing the work were an integral part of the change-over planning. So, when mark sense meter reading became a reality, the men doing the work were looking forward to it as their own program—one which would make their work easier and more efficient. There were practically no difficulties encountered with mark sense meter reading, even though Portland is reputed to have a rather damp climate.

The same methods applied all down the line:

Operators who formerly prepared bills on our bookkeeping machines took part in conferences at which we finalized our IBM billing procedures.

Personnel in our customers' office department were given a chance to prove for themselves how the IBM system would make their work easier and more accurate. Subsequent experience has established that our IBM postcard bills are actually treated with more respect by customers than the previous bookkeeping machine bills. The stubs from the IBM bills come back from customers cleaner and easier to read, making accounts receivable work in our customers' office department inevitably easier.

It soon became obvious that we would have to change from bills based on thousands of cubic feet (Mcf) to a therm billing system, thereby providing a uniform measure which would be easily changed from our 570 Btu manufactured gas to natural gas rated at approximately 1000 Btu. However, we were fearful that a change to therm billing made simultaneously or close to the change-over to natural gas might create confusion in the minds of our customers. We therefore arranged to switch to therm billing even before we got our IBM equipment. Both therm billing and the IBM equipment were in use long before we introduced natural gas. In this way, the change-over period—about which, we must admit, we had some apprehensions—ran off in a smooth, almost routine manner.

Payment stubs turned in by customers are put through this reproducer to create full sized cards which are used to automatically process income records, balance cash, post credits and prepare general ledger statements.

With the tremendous calculation capacity of the IBM equipment, of course, there was never any billing extension problem—not even when, during the course of conversion, we had gas of three different Btu ratings going to different parts of our system. Under punched card accounting, all our bills are extended automatically by our IBM 604 electronic calculator. So it was just a matter of having the proper factor in the customer billing cards and the IBM calculator did the rest automatically.

We had been warned that specific billing problems might arise in justifying day-to-day conversions. That is, in cases where consumers received manufactured gas during a portion of a billing period, and natural gas the remainder of the period.

With the change in Btu ratings, it was, of course, necessary to have crews cover our territory house-by-house, changing the orifices on all appliances and heaters as they went.

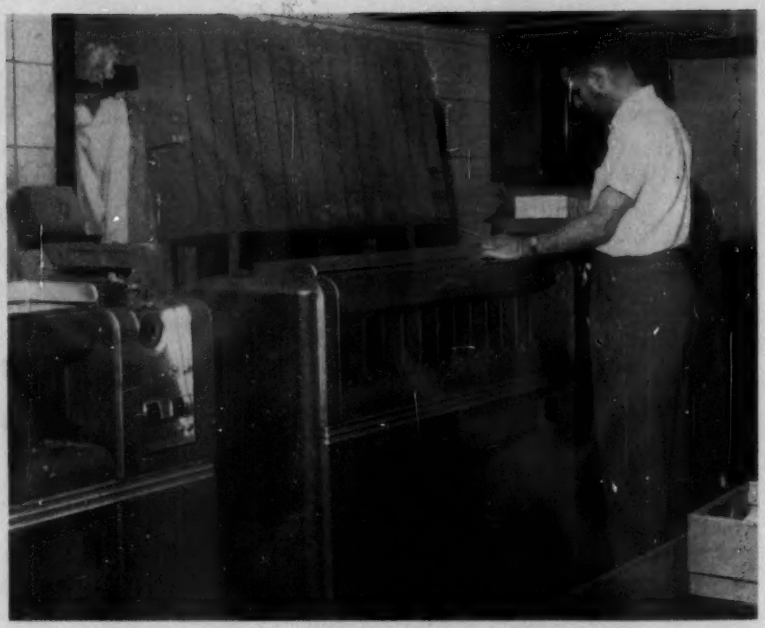
With conversions going forward at about 1000 customers per day, it was necessary to adjust each bill so that allowances would be made for the use of two different types of gas during a single billing period. This was one place where advance planning really paid off. Mr. Reverman, calling on more than three decades of gas company billing experience, worked out a surprisingly simple plan under which just three clerks

were able to handle all conversion calculations, putting out punched cards which fit immediately into our routine IBM billing cycles.

Under Mr. Reverman's plan, the Public Service Commission approved a method under which we could work with all meter readings at face value, in hundreds of cubic feet (Ccf). Conversion reports, which came in from the field daily, contained readings of customer meters at the time each was switched over to natural gas. Mr. Reverman had worked out mathematical factors relating the therm ratios of manufactured and mixed gases then in use to natural gas. So, as conversion reports came in, the three clerks merely multiplied month-to-date consumption by the proper factor. In effect the previous readings on the advance reading cards were advanced sufficiently so as to reduce the unbilled, low-Btu manufactured gas registered by the meters at conversion time to the equivalent of high Btu natural gas. Thus the IBM routines were able to function in their normal manner all through the conversion, using only the one regular card per customer, which, so far as we have been able to ascertain, is the first time in utility history that only one card was used when proration was required.

The current billing routines themselves are almost completely self-perpetuating. For each route that he covers, the meter reader gets a group of IBM cards—one for each customer—reproduced automatically from a master deck. A series of strokes with an IBM electrographic pencil, placed in ruled spaces to correspond with the current meter reading, are now his total responsibility. There are no figures to write in—no subtractions.

When the cards are brought back to the office and put through the IBM mark sensing reproducing equipment, holes are automatically punched into the reading cards and these holes assume the same numerical value as the pencil strokes made by the meter readers. The meter reading card thus becomes the billing card. Usage, billing and tax amounts are then automatically extended by the IBM calculator. These cards, together with master name and address cards, are used to write IBM post card bills on an accounting machine.



Card punch is used for manual preparation of cards, including cards for partial payments or items which were not accompanied by bill stubs.

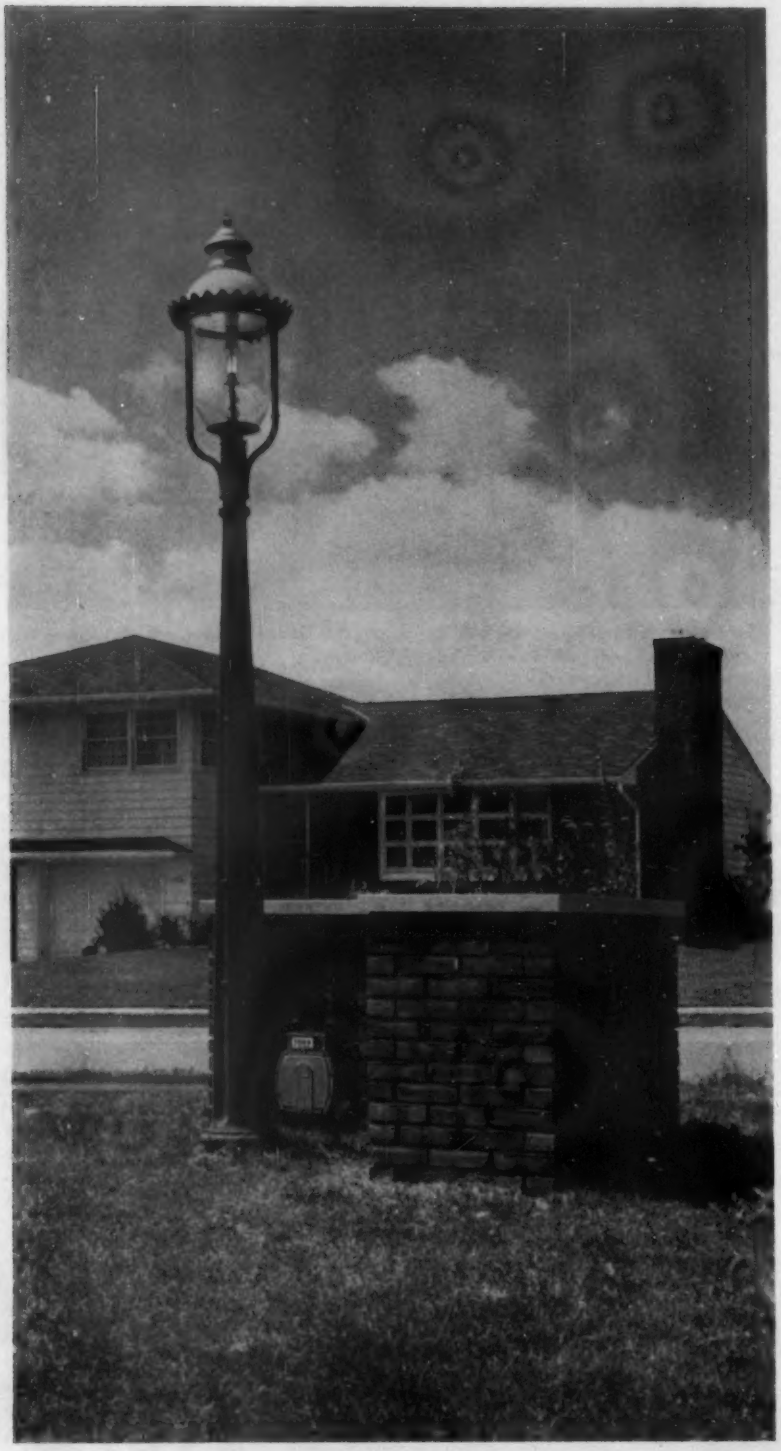
Current reading information, including date, cubic feet, therms and amount, is then entered automatically from the billing card onto an IBM continuity card for each customer. On these, we accumulate complete consumption information for every account for a two-year period. This gives us, more completely and accurately than we have ever had it, a complete running history of the activity of each of our customers.

Punched bill stubs, returned by the customers with their payments, are used to automatically create full-sized credit cards, which are used to produce a cash reconciliation report on the accounting machine, and then by use of the collator the credit cards effect daily cash posting automatically to the accounts receivable files in the customers' office department.

It didn't take long for us to realize additional benefits as by-products from our basic IBM system. Our customer billing cards are now coded into 84 area breakdowns within our marketing territory. After the cards are used for billing, they provide us with valuable market research data, enabling us to pinpoint usage trends, direct our sales activity, etc. Also automatically, the IBM cards help us spot accounts which have been inactive long enough to warrant removal of meters from the premises.

In addition to these purely consumer paperwork functions, the IBM equipment also has been put to work handling our payroll and our stockholder and dividend records. It is anticipated that more general accounting work will be added to IBM operations as increased efficiency makes more machine time available.

All told, it is not hard to conclude that punched card accounting equipment has played a major role in hurdling the administrative problems which came with our becoming a bigger company. Things are running so smoothly now that the IBM methods seem to our employees like the "natural" way of doing things. In the utility business, however, "smooth" growth can be achieved only through careful planning. Today's efficiency, we feel, more than pays us back for yesterday's painstaking planning. ■



Entrance to Blue Flame Village is marked by an authentic gas lamp, creating an all-gas atmosphere. Unique placement of the gas meter in the brick planter both shelters the meter and hides it from street view.

Success of all-gas village prompts new promotion

"BLUE FLAME VILLAGE," one of the country's finest all-gas housing developments, has celebrated its first anniversary and from all indications the Ohio Fuel Gas Co. and other sponsors have just scratched the surface of the potential market for these quality homes.

These all-gas homes in Upper Arlington, an exclusive residential suburb of Columbus, Ohio, were first opened to the public Oct. 1, 1956, in the first phase of a project that initially envisioned an ultimate goal of more than 100 homes. At the time of the opening, a number of homes were completed and more were under construction. The homes, ranging in price from $26,500 to $39,500, were representative of the 28 basic floor plans carefully selected for use in the village. There are now 34 homes completed and 14 more under construction, and plans call for more than 300 homes as the final goal in this campaign for natural gas consumers, according to Charles H. Wirth, Columbus district business promotion manager of Ohio Fuel Gas Co.

All homes in the village are sold fully equipped with gas appliances including air conditioning and heating units, refrigerators, kitchen ranges and water heaters. The cost of the appliances is included in the purchase price of the homes. Automatic washers and matching gas dryers are optional equipment that may be included.

Ohio Fuel Gas, a member of Columbia Gas System, cooperating

Almost every style of home is represented in the village—ranch, contemporary, split-level, story-and-half, and two-story, with as many varieties of building material to choose from.

with local builders and suppliers, used its promotional facilities to conduct a broad campaign in the Columbus area in support of this project. Ohio Fuel's advertising department ran extensive display advertising in the local papers; radio and TV commercials were prepared; descriptive booklets were written and distributed; posters and stickers were created; news stories and photos were placed in all local newspapers and a press party was staged just prior to the opening.

Almost every style of home is represented in the village, including ranch, contemporary, split-level, story-and-half and two-story. Building materials can be chosen from frame, brick, stucco and stone. Every home built is also matched to a corresponding lot by an independent architect based on the construction, size and shape of the lot. Two homes of similar appearances are not placed in the same block or across the street from each other in adjoining blocks. The rubber stamp appearance of many housing developments has been successfully avoided.

The convenient location of the Blue Flame Village has also added to its popularity. It is situated one block from a new, modern high school, six blocks from a large shopping center, and it is only a 15-minute drive from downtown Columbus.

The American gas meters used in outdoor settings, and the water savers for the air conditioning units, are carefully placed and blended with the landscaping to enhance the clean lines in the overall appearance of the village.

The great success of this project has induced Ohio Fuel Gas to consider promoting another all-gas village in another suburban Columbus area, and plans are now being made for the promotion of such a project in the near future. ■

Cost of gas appliances is included in the purchase price of the homes. The all-gas homes feature air conditioning and heating units, refrigerators, built-in range tops and ovens, and water heaters.

The student at the left isn't baking a pie, he's slipping a sand mold into the oven for curing. The built-in ovens are used for foundry work at the foundry-lab of Brooklyn Polytechnic Institute. Dr. William H. Ruten watches the operation.

Modern kitchen isn't only place for eye-appealing built-ins

THE trend in modern kitchens is to build a shiny, color-styled gas range into the wall. Few manufacturers of such built-in ranges ever had in mind that their eye-appealing, chrome and porcelain-enamel appliances would ever be applied to what many consider the "dirtiest manufacturing job in the world."

Nonetheless, two built-in Caloric gas ovens are now doing foundry work at the Polytechnic Institute of Brooklyn, N. Y. Dr. William H. Ruten, who had the kitchen appliances installed in his foundry-laboratory, believes that gas ovens might be as ideally suited to foundry baking as they are for home cooking.

Dr. Ruten points out that the oven heat control on such ovens provides the correct range of temperatures for most shell molding processes. The units are also easier to keep clean and are far more attractive to work with than normal foundry equipment.

Dr. Ruten also claims his two ovens help to stress to his students an overlooked fact about foundries. "A good deal of foundry work is done in places that look like back alleys and are among the dirtiest places in the world to work," Dr. Ruten says. "These attractive gas ovens point up the fact that a lot of foundry work can be as clean as working in the kitchen."

"Incidentally," Dr. Ruten says, "they are so easy to keep clean that we also use them for cooking beans and hot dogs at some of our informal sessions after school."

The built-in ovens, which stand side-by-side on an aluminum rack, operate at different temperatures during the shell-molding process. One oven heats a shell plate to 450°F. The plate is then removed and dipped in a box of sand and resin. The box is inverted, the excess sand falling away, leaving about ¼ in. of sand adhering to the plate. The coated plate is then placed in the second oven for about five minutes where it is cured at 600°F to form one side of a finished mold.

"The only limitation to using kitchen ranges in the shell-molding process is in the size of the ovens, but they are ideally suited to small foundry jobs," Dr. Ruten says. ■

5TH IN A SERIES ON APPLIANCE CONTROLS

What a serviceman should know about . . .

LOW VOLTAGE HEATING CONTROLS

By **ROBERT L. FARMER,** General Controls Co., Glendale, Calif.

A large part of the serviceman's job today is diagnosis. Judging from the progress of the past, we can depend on two things—

(1) Automatic control systems of the future will be more complex as the public demands finer control of temperature and distribution, and

(2) Very few systems will be alike, as manufacturers of heating equipment continue to bring out unique products.

Not so long ago it was no problem to isolate trouble and correct it in a low voltage control system. Control devices were individual components installed in various locations over the heating equipment. Problems and difficulties were fairly obvious. Today it's a different story! Separate parts are united in control packages.

For example, the valve in *Fig. 1* is a pilot line "B" valve, manual gas cock "A" valve, pilot gas filter, main line gas pressure regulator, main line automatic gas valve and pilot safety device—all in one structure no larger than your two fists. This unit might well be combined with the panel (*Fig. 2*) which contains operating control, low limit switch, high limit switch, transformer and two relays. These two modern controls replace eight or 10 individual components which were previously used in control systems.

The combination control helps the heating equipment manufacturer keep costs down without sacrificing safety, quality or efficiency. As a result, better heating equipment is available to more people. It makes sense to combine related control functions into central packages. The serviceman can expect to see a much greater use of these combination controls.

The combination control, no

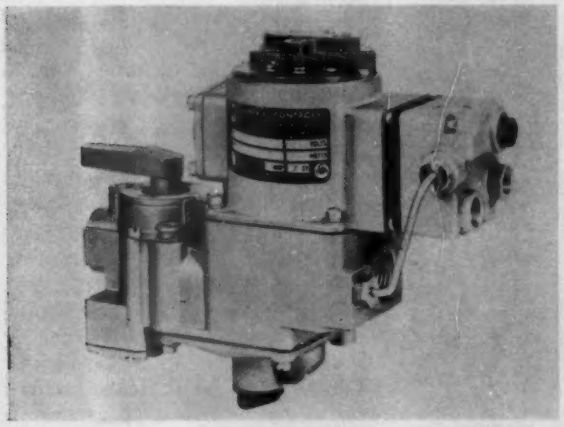


Fig. 1. Combination gas valve, includes cocks, regulator, automatic valve, pilot safety valve, and relay.

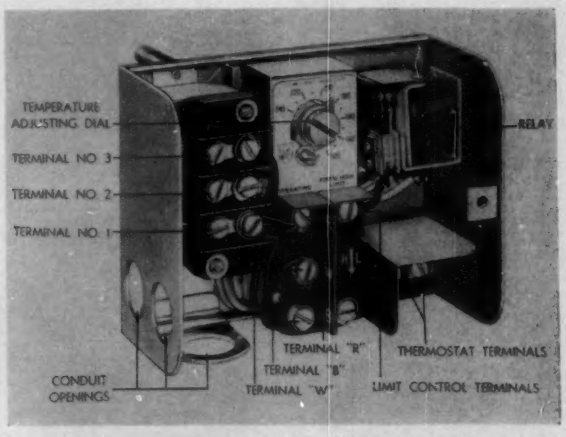


Fig. 2. Combination immersion control and relay. Includes power terminals, operating temperature control, limit control, and circulator relay.

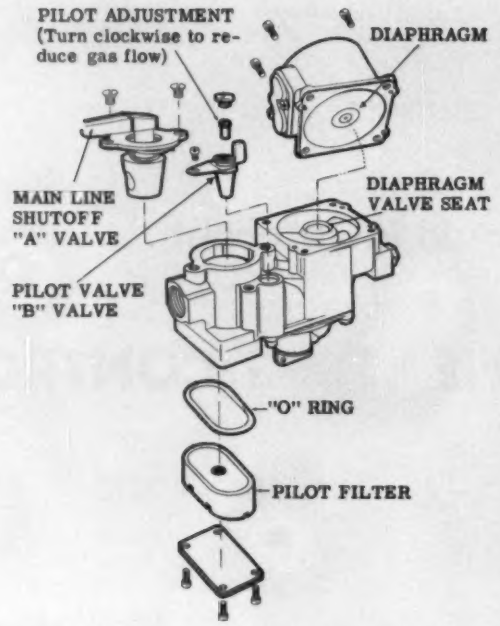


Fig. 3. Combination valve disassembled for service or replacement.

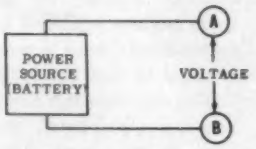


Fig. 4. Power source for controls.

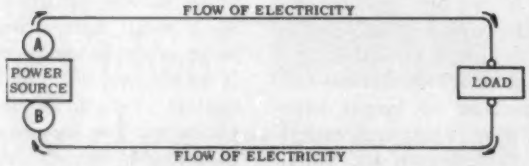


Fig. 5. A completed path for electricity with a load operates the load as long as the power source continues to generate power.

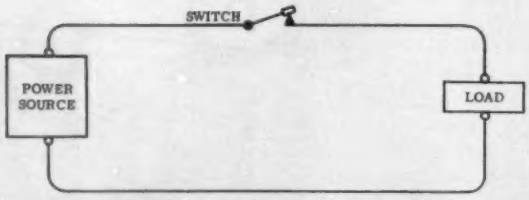


Fig. 6. A power source, a switch, and a load make up a controlled circuit.

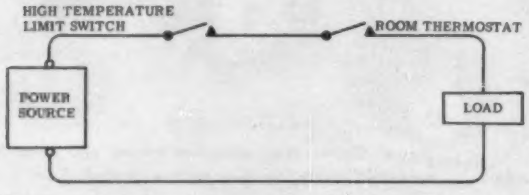


Fig. 7. A typical control system has several switches.

matter who manufactures it or what individual control functions it performs, provides an interesting challenge to the serviceman. What approach does his training take? Certainly, we must understand that the combination control is basically an assembling of previously separated units. It, therefore, presents no mystery as long as we are well grounded in basic fundamentals of controls and control systems.

Secondly, the serviceman appreciates the fact that the cost of a combination control is just about the sum of the costs of the individual items. The "quick change artist" is going to be in trouble. He is the one who replaces one control after another until he thinks he has corrected some difficulty. Combination controls are expensive. It would be a disservice to the public to replace complete combination controls when just one part needed changing or adjustment. *Fig. 3* illustrates the extent to which a typical combination control valve might be disassembled for service or replacement. A replacement operator, diaphragm or pilot gas filter might represent one-tenth the cost of the complete combination control.

The serviceman's job has become even more important. His training must be more thorough. He accepts greater responsibility for decision. The serviceman of today and tomorrow must first be able to quickly locate the cause of trouble. Once this has been done, the correction of difficulty is relatively simple.

In the way of technical knowledge about low voltage automatic controls and control systems, what can a training system give a serviceman? First, an understanding of the fundamentals of basic electrical circuits as they apply to control systems. Here is one way of explaining the basic electrical circuit.

All electrical circuits have a source of power. The power source (*Fig. 4*) may be a steam generator, a battery, a pilot generator or, in the case of a low voltage control circuit, a transformer. Between the two terminals "A" and

IF YOU DO THIS	AND THIS HAPPENS	YOU KNOW THIS	AND WILL TAKE THIS ACTION
Turn thermostat dial up to 90°. Turn switch ON. **1**	Valve does not turn ON.	Electrical power OFF or open switch, poor wiring connection, damaged valve.	Leave Thermostat ON--calling for heat and proceed to next step.
Momentarily jumper across secondary terminals of transformer. **2**	Spark	Power and transformer OK.	Proceed to next step.
	No spark	No power or transformer burned out.	Check power plug, fuses, disconnect switch or replace transformer.
Momentarily jumper "TRANS" terminals of valve. **3**	Spark	Power ON--circuit OK.	Proceed to next step.
	No spark	Open circuit, due wiring connection or limit switch.	Check limit if in circuit. Correct wiring.
Momentarily jumper "LIMIT" of "AUX" terminals of valve. (If no wires are connected to these terminals, there should be a jumper clip installed. **4**	Valve turns ON.	Limit switch not making contact or open circuit in wiring.	Momentarily jumper limit switch terminals to prove switch.
	Valve remains OFF.	Limit switch circuit may or may not be OK.	Proceed to next step.
Momentarily jumper "THERM" terminals of valve. **5**	Valve turns on.	Thermostat not making contact or open circuit in wiring.	Momentarily jumper thermostat terminal screws at thermostat.
	Valve remains off.	Thermostat circuit may or may not be OK.	Proceed to next step.
Remove relay and momentarily jumper between the two horizontal holes. **6**	Valve turns on.	Relay not making contact due either to relay or generator.	Proceed to next step.
	Valve remains off.	Vent line clogged.	Clean out.
		Valve operator damaged.	Replace operator.
Observe pilot flame. **7**	Steady, blue flame covering thermocouple cartridge.	Flame OK.	Proceed to next step.
	Flame yellow and lazy or too small to heat 1/4 to 1/2" of tip.	Thermocouples not getting enough heat to operate valve or relay.	Check pilot adjustment, clean orifice and primary air holes. Position couple.

Table I. Field checking low voltage control systems.

"B" of the transformer, there is a difference in electrical pressure. This pressure is usually called "voltage." The voltage is the pressure which forces electrical current through a completed circuit (*Fig. 5*).

In *Fig. 5* the power source is connected to a load which does useful work but is not "controlled." The load may be a motor, relay or valve designed to operate from this power source. Electrical current is pushed through the load and *completed* wiring circuit by the voltage (electrical pressure) of the power source. The load operates as long as the power source continues to produce voltage.

In *Fig. 6*, a switch is used to control the flow of electricity to the load. When the circuit is broken by opening the switch, no electricity flows. When the circuit is completed by closing the switch, electricity flows in the circuit. Thus, operation of the load is now controlled.

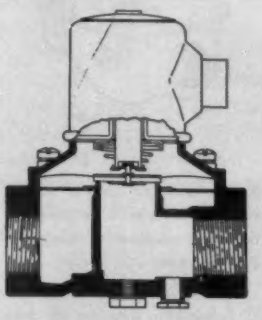
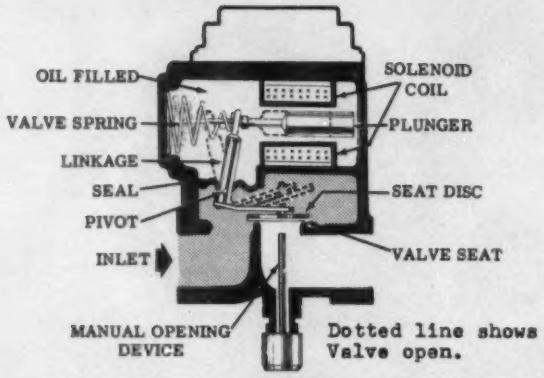


Fig. 8. Conventional solenoid valve.

The switch may be a thermostat, temperature or pressure limit switch or pilot safety relay. Most likely more than one switch is required for adequate control. The typical control system (*Fig. 7*) has several switches.

For simplicity, only two switches are shown in *Fig. 7*. Any number may be added in a row. A boiler may have a room thermostat, steam pressure switch, low water cut off, pilot safety relay and a clock. These switches would be wired into the circuit one after the other in what is called a "se-



SOLENOID DE-ENERGIZED - VALVE CLOSED

Fig. 9. This is how the solenoid principle is adapted to a Hydranoid valve.

ries" circuit. Because the switches are in "series" (one after the other), opening of any one switch stops the flow of electricity to the load.

In summary, the transformer is the source of voltage (electrical pressure). It must be adequately sized to deliver full current at normal voltage. Of course, the load must be suitable for the power source from which it operates. Electrical current flows only in a completed electrical circuit. The circuit is composed of power source, wire, switches and load. The wire and switches must be suitable to handle the current drawn by the load.

Now we see why the serviceman must be 75 per cent detective and 25 per cent fixer. Finding the cause of a service call is the major task.

A very good method of testing control systems is with a volt meter or tattle light. However, volt meters or test lamps are not always available. Quite reliable results can be obtained without these instruments. The serviceman can quickly locate the causes of most service calls, by following a logical procedure of eliminating possible source of trouble—one by one.

This process is not fool-proof but it will save needless and wasteful replacement of a good many controls and get installations back into operation quickly. This logical procedure checkout process is applicable to combination controls. The first step is to prove out the power source, then the limit circuit, thermostat circuit and pilot safety circuit. The accompanying *Table 1* was developed as a guide for many systems.

Besides an understanding of the fundamentals of electrical circuits and methods of checking by process of elimination, the serviceman should also be well grounded in mechanical aspects of automatic controls. Operating characteristics of different types of valves, switches and thermostats are important. In fact, it is more important to recognize the characteristics of different types of controls than it is to know all the nuts, bolts and screws of one specific model.

All low voltage gas valves, or certainly the most common ones, work on one of three basic principles. A conventional solenoid valve is pictured in *Fig. 8*. The characteristic is a moving plunger which travels inside a solenoid coil.

Fig. 9 shows how the solenoid principle is adapted to a Hydranoid valve. When equipped with the Dial-A-Flow feature, this silent operating Hydranoid type valve has a unique step opening characteristic for smooth ignition. The typical solenoid has a quick opening and quick closing characteristic and has an audible click when energized or de-energized. The Hydranoid has a slow step opening and slow closing characteristic and has no operating sound.

Servicing of conventional solenoid valves such as those in *Figs. 8 and 9* is limited to problems of opening, closing or noise. In the event the valve won't open, make the check outlined in *Table 1*. This will assure electrical power to the valve. With all switches set to call for heat, a test light across the valve coil leads will light if there is power to the coil. If you know there is power to the terminals of the coil and no hum or vibration can be felt, replace the coil.

Repeated coil burnouts are generally attributed to high surrounding temperature and excessive voltage and particularly a combination of both. If excessive gas pressure should keep a valve from opening, the coil will often

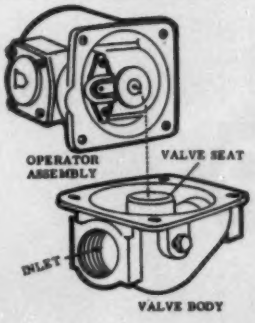


Fig. 10. Operator or "power head" of Hydranoid valves may be removed as a unit for purpose of cleaning valve disc or seat.

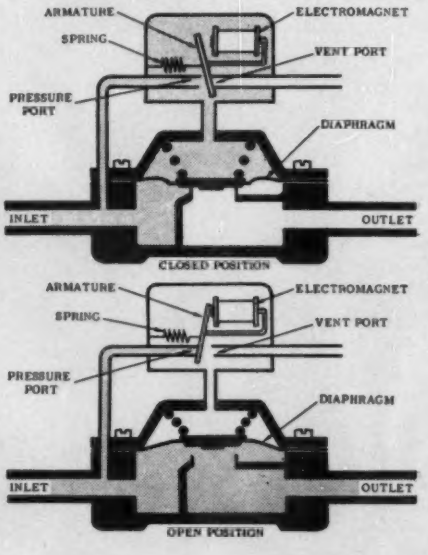


Fig. 11. Schematic drawing of diaphragm valve in operation.

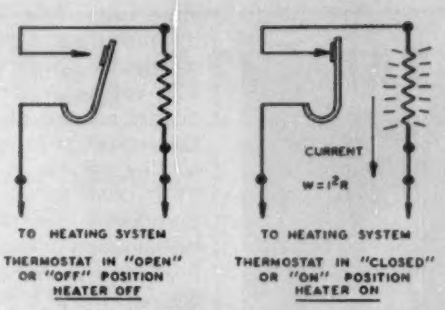


Fig. 12. Schematic drawing of heat anticipation in a heating thermostat circuit.

burn out due to the increased current drawn by the valve coil.

The complaint that a valve won't close is most likely due to dirt or foreign matter inside the valve. First turn off the electrical power to be sure the difficulty is not due to a faulty switch or short circuit. If the solenoid valve still sticks open, turn off the gas and follow the manufacturer's instructions to clean the valve. Never lubricate any interior part of a gas valve. Special care should be taken in handling the parts. The solenoid plunger tube is relatively thin walled and can be damaged. If the plunger tube is bent or knicked, replace the valve.

Buzzing noise in a solenoid valve is most likely due to (1) low voltage, (2) loose parts (washers, springs, etc.) under the coil jacket, or (3) foreign matter in the top of the plunger tube. The serviceman can check each of these possibilities.

Hydranoid (*Fig. 9*) and oil filled valves do not require field adjustment. The operator or "power head" of these valves may be removed as a unit for purpose of cleaning valve disc or seat (*Fig. 10*), but the cover plate must not be removed from the operator or power unit.

Some valves operate from a "heat motor," warping of a bi-metal element by heat from an electrical resistance mounted on the bi-metal. The characteristics of this type valve are slow opening and slow closing. Field service of heat motor type valves is limited to checking for adequate voltage and disassembly for cleaning valve seat.

The other widely used type of valve is the diaphragm valve. There are a number of types in the field but all operate on basically the same fundamental principle. This is most easily described with the aid of the simplified schematic diagram in *Fig. 11*.

The "operator" consists of a three-way valve with pressure port, vent port and a common port in between. The operator allows gas to fill the chamber above the diaphragm or allows the small amount of gas to bleed out of the chamber. The mainline gas pressure does the work of opening and closing the main valve. If the vent line becomes clogged, the valve cannot open at all because the gas cannot bleed out of the chamber.

Failure of diaphragm valves to open is most likely due to (a) no electrical power at the valve coil, (b) clogged vent line tubing, (c) low main gas line pressure. A test light, volt meter or step by step procedure as in *Table 1* will locate any difficulty due to electrical power. The clogged vent line is statistically the most frequent cause of service calls on diaphragm valves. The tip of the vent line should be near but not in the pilot flame.

Leakage or failure to close is generally caused by foreign matter in the area of the valve seat or disc. The operator or power unit can be removed for cleaning as illustrated in *Fig. 10*. No adjustment of the operator or top section should be attempted in the field. Never attempt to increase or decrease spring tensions. Never attempt adjustment of the small interior working parts of automatic valves.

Keep in mind that automatic valves are safety controls. They are designed, field proved and fully tested to do the job for which the heating equipment manufacturer uses them. The serviceman often has a choice of replacement or repair. On combination controls, the cost factor demands repair or replacement of parts. On individual controls, it may well be a saving to install a reconditioned valve rather than to buy parts for a faulty valve. Regardless of action taken, the serviceman must take the responsibility to check and double check his work before leaving the installation.

Thermostats, and pressure and temperature limit switches can be tested by watching their operation during changing conditions. Clean contacts are important. An amazing number of complaints on thermostats have been due to foreign material inside of the thermostat case—a piece of sponge or cardboard protective packing was left in the thermostat, a cookie or child's small toy, or extra wire that was not pushed back into the wall. Take a look inside the cover —then take a look at the surroundings.

A common complaint is "I must keep setting the dial higher and higher to keep the room comfortable in the evening." This indicates the thermostat is being "fooled" into thinking the room is warmer than it is. Most likely cause is a television set, hi-fi set, lamp or other high wattage appliance is under or within a few feet of the thermostat mounting. Less conspicuous is a hot water pipe in the wall, a stove behind the wall, or a radiator or register directly heating the thermostat. The exact same complaint can be the outcome of too much heat anticipation in the thermostat. On the other hand, too little heat from the anticipator—too high a setting on the scale—causes noticeably wide room temperature swings. The room becomes too hot, then too cold.

Nowadays, nearly all thermostats use some kind of heat anticipation. Its purpose is to improve temperature control by cycling the heating system at a de-

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sired rate. This is accomplished by installing a small electrical resistance inside the thermostat. The resistance produces a very minute amount of heat when the thermostat is in contact and the heating system is on (*Fig. 12*). This speeds up the reaction of the thermostat. The thermostat turns the burner *off* early and lets the heating system coast up to the desired room temperature. The end result is heating cycles a little shorter and closer together.

For proper adjustment, set heat anticipation adjustment lever or select a color coded heater plug to correspond to the current (amps) drawn by the valve or relay. This figure is always shown on the name plate of the valve or relay. For longer "on" time, set lever or select a plug slightly *higher* on the scale. For shorter "on" cycles set the anticipator slightly lower on the scale. Move lever type anticipators only ¼ to ½ scale division at a time on the final adjustment.

Some gravity warm air and forced air heating systems are purposely cycled on and off at a fairly rapid rate. "On" cycles lasting 8, 5 or even 3 minutes in moderate weather are quite common gas systems. This faster cycling is controlled by the heat anticipator.

A great deal more can be covered about field service of low voltage control systems. Zone control, summer-winter air conditioning systems, various combinations of controls for boiler providing heating and domestic hot water are a few of the areas of interest to servicemen. But in training curriculum, two old sayings still apply: "first things first" and "a few things well taught are far better than many things skimmed over." By knowing the basic fundamentals and applying a detective approach of breaking a system down to fundamentals, the serviceman can do his job with confidence and dispatch. ■

This series continues next month with an article telling what the serviceman should know about automatic range-top controls.

GAS • ASSOCIATIONS

Gas equipment corrosion feature of NACE meet

Corrosion of metals underground will get a major share of attention in the technical program of the 14th annual conference and exhibition of the National Association of Corrosion Engineers. The conference will be held in San Francisco's Civic Auditorium, March 17-21.

Installation of inert anode ground beds at depths up to 350 ft to protect gas pipelines is the subject of one paper during the cathodic protection symposium. In this same symposium, another paper will discuss solution of a stray current problem involving a pipeline paralleling a 4000-v direct current railway system.

Management section plans 4th annual conference

March 31-April 2 are the dates of the annual conference of the AGA's general management section. Meeting place is the Hotel Shoreham in Washington.

General sessions include speakers on such topics as the economic outlook, the significance of higher costs of money, manpower demands of the gas industry, marketing research as a tool of gas company management, and the importance of inventory control. Dr. Martin A. Elliott, director of the Institute of Gas Technology, will explore some of the long-range possibilities of the gas industry, extending into the future when pipelines might distribute non-fossil fuels.

Several committees will meet at afternoon sessions during the conference. Some of these will be program-type meetings of broad interest.

Golden anniversary convention planned by SGA

The Southern Gas Association will hold its golden anniversary convention on April 28-30 in Dallas.

Scott Hughes, general convention chairman and vice president of Southern Union Gas Co., anticipates a record-breaking attendance of 2200 or more.

A "Gas Industry Week" is planned for Dallas at convention time. Special events will focus attention on the important role of natural gas for home, office, and factory. In addition, the convention program will trace the rise of the gas industry and will show how natural gas has helped in the South's remarkable growth over the last 50 years.

Abbott joins AGA's Washington Staff

Stewart Abbott has been named to the Washington staff of the American Gas Association. Mr. Abbott will serve as utilization engineer, a new post in the Washington office, to provide information and advisory services for federal departments and bureaus.

Mr. Abbott was a regional manager for Servel Inc. for 21 years, the past 11 on the Pacific Coast after 10 years as Southwest regional manager.

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3. Kraloy's lighter weight lets your trucks carry more pipe footage.
4. Kraloy delivers cleaner gas—reducing foreign deposits in jets, valves, etc.

WHEN YOU SPECIFY YOUR NEXT INSTALLATION, DO AS OTHER LEADING GAS COMPANIES DO...SPECIFY KRALOY PVC PLASTIC PIPE!

Representatives:
The Mack Company—Houston, Texas
H. J. Hodes—Kansas City, Mo.
The Crane Co.—Los Angeles & Denver
Southeastern Distributing Co.—Miami

Call, write or wire for detailed information and specifications.

KRALOY *plastic pipe co., inc.*
4720 East Washington Boulevard, Los Angeles, California
Subsidiary of the Seamless Rubber Co., a Rexall Drug Co. Subsidiary

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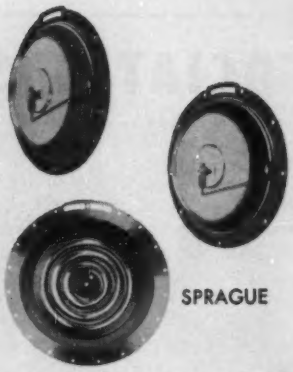
- Complete Assemblies
- Metal-Rimmed
- All-Leather



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Heart of Accuracy

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Time-tested . . . meter-proved . . . Lancaster Diaphragm performance is unexcelled. Lancaster-processed leather is soft, supple, yet firm; retains oil 10-20 years. Grooved metal rims are stronger, more rigid . . . hold leather firmly in place. Endless Metal Rings assure uniformity in the amount of leather and depth of pocket.

Lancaster Diaphragms are precisely balanced and centered. Lancaster complete diaphragms for 1-A Sprague Gas Meters feature built-in adjustable carrier wire assembly and are available with successful synthetic material . . . A Lancaster First!

For greater accuracy in Sprague, Ironclad, Tobey and tin gas meters . . . and gas regulators . . . use Lancaster Diaphragms.

Lancaster Meter Parts Co. also provides prompt, efficient repair service for Emco and Metric diaphragms.

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Lancaster METER PARTS CO.

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GAS • PEOPLE

Richard Leusch
Peoples Natural

E. H. Williamson
Peoples Natural

Peoples Natural Gas Co., Pittsburgh, has named RICHARD L. LEUSCH general sales manager and E. H. WILLIAMSON assistant to the vice president of operations. Mr. Leusch was formerly assistant sales manager of East Ohio Gas Co. Mr. Williamson, with the company for almost 25 years, most recently was superintendent of production and transmission.

ROBERT H. SCHIFFERDECKER and LAWRENCE F. O'CONNOR have been promoted to senior industrial sales engineer and senior domestic sales engineer, respectively, by Peoples Gas Light & Coke Co., Chicago. Mr. Schifferdecker joined Peoples Gas in 1948 and has been an industrial sales engineer since 1950. Mr. O'Connor has been with the company since 1931.

Several appointments have been made by New York State Natural Gas Corp., Pittsburgh. HARRY A. OFFUTT is now assistant treasurer, succeeding FRED A. JAXTHEIMER, who retired late last year. DONALD T. SHERRILL, who joined the company in 1951, is personnel and labor relations director and WILLIAM G. HEINRICH has been named salary and benefits administrator.

Pacific Gas & Electric Co., San Francisco, has made several divisional appointments. CHRIS H. PEDERSEN has taken over as gas superintendent of the East Bay division. He succeeds THOMAS P. JENKINS, who was appointed manager of the Humboldt division at Eureka. JOHN BIANUCCI, former division gas engineer at the East Bay division, succeeds Mr. Pedersen as gas superintendent at Stockton. JOHN G. SMITH, distribution engineer in the San Francisco general office, assumes Mr. Bianucci's

duties in Oakland. These promotions resulted from the retirement of DAN F. VILLA as manager at Eureka. Mr. Villa has spent his entire career with PG&E and its predecessor, the Western States Gas & Electric Co. in the Humboldt region. In 1913 he joined a line crew of Western States and began his steady rise toward the post of division manager.

DOUGLAS HOTES has been named Los Angeles area sales representative for Utility Appliance Corp. and its Gaffers & Sattler contract division.

JOHNANNE HOLLABAUGH has been appointed home service director for the Ohio Fuel Gas Co. in Cambridge, Ohio.

DONALD E. HERRINGSHAW has resigned as vice president in charge of gas operations of Consumers Power Co., Jackson, Mich., under the company's retirement program. He is succeeded by JOHN P. SIMPSON, who has been general supervisor of gas operations. Mr. Simpson also has been elected vice president of Michigan Gas Storage Co., a Consumers subsidiary. HERMAN L. FRUECHTENICHT, who has been general superintendent of Michigan Gas Storage, has been promoted to director of gas procurement and development for Consumers Power, a new post. He is succeeded as general superintendent by EUGENE B. HEDGES. FRED H. BUNNELL has succeeded Mr. Simpson as general gas operations supervisor. Mr. Bunnell formerly served as general supervisor of gas distribution.

EDWARD L. BURTON has joined Acme Engineering Agency, Fisher Governor Co.'s sales representative in Indiana.

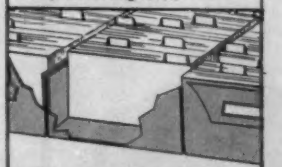
Eleven new vice presidents were elected by A. O. Smith Corp.'s

R. H. Schifferdecker
Peoples Gas

L. F. O'Connor
Peoples Gas

in the world's **NEWEST MECHANIZED ROTARY FILES** by **DIEBOLD**

Records revolve in upright position . . . travel shorter way to working level.



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For automating the handling of active records . . . investigate the unprecedented posting and referring advantages introduced by the new Diebold mechanized Rotary Files. They *accommodate* existing records on any grade of card or paper stock . . . *eliminate* punching and transcribing . . . *save* up to 50% in time and space costs. There are 26 models of Diebold Mechanized Files for meeting all requirements in record sizes, volume and activity. Note how extra knee room is provided by swept-back design. Write today for descriptive literature on the world's newest and finest mechanized Rotary Files. DIEBOLD, INC., CANTON, OHIO.

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board of directors. They are: M. E. MORGAN, W. W. HIGGINS, S. E. WOLKENHEIM, R. F. MCGINN, all of whom will continue to function as members of the management staff in the following areas, respectively: procurement, engineer, marketing, research and development. Two new operating vice presidents are J. H. BRINKER, in charge of Permaglas consumer products; and JOHN S. RANDALL, in charge of industrial products. Commercial vice presidents, who have been serving as regional managers, are: W. W. STAKE, eastern region; GEORGE P. HOUGH, midwestern; L. M. KEATING, southwestern; ALLEN O. DRAGGE, Pacific Coast; and WALTER H. PORTH, in charge of relations outside the U. S.

CLIFFORD A. BRANDT has joined Houston (Texas) Natural Gas Corp. as executive staff engineer. Closely identified with utility rate and regulatory matters for the past 30 years, Mr. Brandt most recently was assistant vice president of H. Zinder & Associates in Dallas.

CHARLES L. YOST has taken on new responsibilities as industrial development manager of Peoples Natural Gas Co., Pittsburgh. He formerly was general sales manager. Peoples Natural also has promoted RICHARD E. DU VALL to general superintendent. He has been superintendent of distribution.

Charles Yost
Peoples Natural

Richard DuVall
Peoples Natural

PAT H. LUCKETT, sales manager of Rockwell Manufacturing Co.'s instrument division in Dallas, has been promoted to assistant product manager-gas products for the meter and valve division. Mr. Luckett will headquarter in Pittsburgh.

W. C. SCHUMACHER has been elected an executive vice president and member of the board of International Harvester Co., Chicago. He formerly served as a vice president of the company and executive head of its motor truck division.

J. R. WOODFILL is the newly named manager of industrial gas sales for Northern Indiana Public Service Co., Hammond, Ind. Mr. Woodfill, who succeeds CARL H. LEKBERG, has been supervisor of industrial sales in the Calumet division for the past four years. ROBERT H. HART, Hammond district industrial power sales engineer, succeeds Mr. Woodfill in the Calumet post, and IRA J. ROBERTS succeeds Mr. Hart.

The Barrett division of Allied Chemical & Dye Corp., New York, has named V. C. OTLEY director of sales of industrial tar products and paving materials. The company also named P. B. MAYFIELD as manager of industrial tar products sales.

FRED COKER has been named purchasing agent of Fulton Sylphon division of Robertshaw - Fulton Controls Co.

RICHARD A. ROSAN has been elected assistant vice president of the Columbia Gas System Service Corp. Mr. Rosan, who joined the legal department in 1951, also was elected assistant counsel.

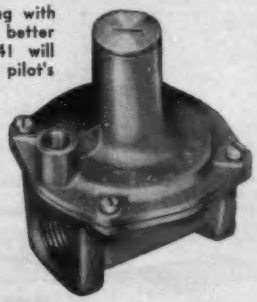
Holly-General Co., Pasadena, Calif., has appointed CHARLES C.

LETTER
11-AM
7UA18
FROM ABROAD
Nairobi
Re: Kenya Tango, Pres.
Hot Cauldron Heating Co.
Dear Boss,
Natives restless tonight — no fire under the pot. Chief Kenya now cooking with gas thanks to Maxitrol's RV-41. Send 1000 Maxitrol regulators next safari.
Your well-seasoned
Maxine

ONE GAS REGULATOR IMPROVES BOTH PILOT & BURNER OPERATION

Both "Cannibal Cooking" and "Cooking with Gas" can be a delicate problem. For better gas range performance, Maxine's RV-41 will keep the "Pot Cooking" and stop the pilot's "Flickering" . . . no matter how the gas load fluctuates. The RV-41 easily regulates gas pressure to both the pilot and main burners at extremely low flow rates of 120 BTU.hr. (0.15 cu. ft./hr. of 0.7 specific gravity gas).

If you want to put an end to your customer's cold dinners and burned pots, meet and beat your competition . . . write Maxine.



MAXITROL COMPANY

12200 BEECH RD.
DETROIT 39, MICH.

MARTIN manager of advertising and sales promotion.

JOSEPH J. DECKER has been named president of the air conditioning division of American-Standard. Mr. Decker, with American-Standard since 1934, has served as acting president of the division since last July. Prior to that he was assistant to the president of the corporation.

DALE JOSEPHSON has been named advertising manager of Portland (Ore.) Gas & Coke Co. Most recently, Mr. Josephson served as manager of the Oil Heat Institute of Oregon.

W. H. HIPSHER, executive vice president of Mueller Co., Decatur, Ill., has been elected to the board of directors of the National Association of Manufacturers.

Five Michigan Consolidated Gas Co. executives have been named to new posts. ROBERT B. ALLEN is now assistant manager of operations. He is succeeded as superintendent of the Detroit company's street department by ROBERT C. BARFKNECHT. Succeeding Mr. Barfknecht as assistant superintendent is ROBERT W. CORNWELL. New general foreman of the street department is HANS T. THOMSON. CLIFFORD A. MOGK was appointed superintendent of operations staff of the company.

JAMES M. STARKE has been named general manager of the Mission Appliance Corp., Hawthorne, Calif.

ERNEST S. FIELDS has been elected president and chief executive officer of Cincinnati (Ohio) Gas & Electric Co. He succeeds WALTER C. BECKJORD, who continues as chairman. Mr. Fields had been executive vice president and general manager. WILLIAM H. ZIMMER, vice president and treasurer, has been elected executive vice president and treasurer. He was also named chairman of the finance committee.

Four men have been promoted in the natural gas distribution division of Mountain Fuel Supply Co., Salt Lake City. They are: WAYNE S. HANSEN from design engineer to distribution engineer; CLAIR F. COLEMAN from mechanical engineer to design engineer; DELBERT C. CUNNINGHAM from crew fore-

ELECTRIC PLANT NEWS

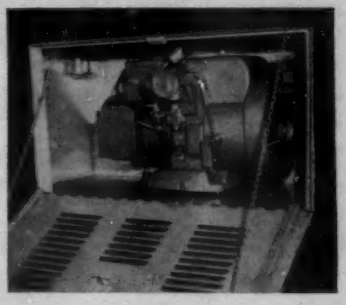
Truck-mounted electric plant cuts costs two ways

Onan Plant provides A.C. power for electric tools and lights, and D.C. output to charge batteries for radio communication.

Utilities using this dual-purpose Onan Electric Plant on trucks report savings ranging from *$2.00 per day* per truck to *$800.00 per year* per truck . . . for the battery-charging feature alone. Before installation of the Onan plant it was necessary to keep the large truck engine running to charge batteries, extremely wasteful from the viewpoint of fuel and engine maintenance.

The Onan plant shown is a Model O7AK, developing 750 watts of A.C. with about 8 amperes for 12-volt battery charging. It is powered by an Onan single-cylinder, air-cooled gasoline engine direct-connected to an Onan all-climate generator in a compact, rigid, long-life unit. A.C. output is sufficient for operation of drills, saws and other tools used for construction and maintenance.

Other vehicular battery charging plants and A.C. models available.



Vacu-Flo cooling system permits enclosed installation

With Onan's Vacu-Flo system, air is drawn (rather than blown) through generator and engine, and discharged through a duct to the outside. An Onan air-cooled plant with Vacu-Flo can be installed in a small compartment within truck or trailer.

Ask your Onan distributor about this dual-purpose unit or write for circular on three battery charging methods.

D. W. ONAN & SONS INC.

3024A University Ave. S. E., Minneapolis 14, Minnesota

ELECTRIC PLANTS • AIR-COOLED ENGINES • GENERATORS • KAB KOOLER

man to foreman in charge of high pressure distribution mains; and CHARLES O. RANEY from crew foreman to assistant distribution foreman.

Hays Manufacturing Co., Erie, Pa., has appointed HENRY E. MILLER, JR., as a new salesman. Mr. Miller will represent the general products division of the company in Missouri, Arkansas, Oklahoma, and Kansas. Hays also has appointed a new junior salesman in the Pittsburgh area. He is STANLEY D. LE MASTER, JR., formerly of the Amstan Supply division of American Radiator & Standard Sanitary Corp.

C. WADE COZAD has been promoted to chief right-of-way agent for Ohio Fuel Gas Co., Columbus. He has been with the company 42 years.

Three promotions have been announced in the machinery and systems division of Carrier Corp. WILLIAM H. MACDONALD is assistant manager of the machinery department, a new post. Succeeding him as product specialist of industrial air and gas compressors at the Syracuse, N. Y. headquarters is FRANK M. FIVES. CLARK T. SHIELDS is moving from the Chicago office to New York to serve as senior sales engineer.

R. E. Reimer
Dresser

John Lawrence
Dresser

W. B. WELGE has succeeded F. E. THOMPSON as purchasing agent for Southern Indiana Gas & Electric.

JOHN J. TUOHY is now president of Long Island Lighting Co., Mineola, N. Y. He succeeds ERROL W. DOEBLER, who has become chairman of the board of directors. Mr. Tuohy first served in the legal department of the company, later as assistant to the president, and more recently as vice president in charge of sales, advertising, employee relations, and publicity.

Furane Plastics Inc., Los Angeles, has made several appointments in its laboratory and plastics sales activities. NEIL P. GEDDA is in technical sales of the building trades division; ARTHUR N. HEATH is in technical sales for the electrical division; ALBERT S. JOHNSON is a laboratory technician; MASUO TOJI is a research chemist; and IRVING AZAREN is a research technician.

Midwestern Manufacturing Co., Tulsa, has appointed RAY O. BRANAM as general manager in charge of engineering, production and sales.

Brooklyn (N. Y.) Union Gas Co. has elected SAMUEL GREEN senior vice president and A. DUDLEY HARRISON vice president and chief engineer. Prior to their elections, Mr. Green was vice president and chief engineer and Mr. Harrison was assistant vice president. Brooklyn Union also has elected WINSTON E. HIMSWORTH secretary. Mr. Himsworth, formerly assistant vice president, succeeds RICHARD B.

What's Briggmann looking at?

George Briggmann, UNION CARBIDE's specialist in the use of CARBOSEAL Anti-Leak, is inspecting another bell-and-spigot joint effectively sealed with CARBOSEAL Anti-Leak. Municipal gas companies have found CARBOSEAL Anti-Leak the answer to problems resulting from the changeover from wet manufactured gas to dry natural gas.

CARBOSEAL Anti-Leak swells dried out packing fibers in bell-and-spigot joints—thus, it solves four problems because it:

- *corrects leakage*
- *eliminates vegetation damage*
- *reduces maintenance costs*
- *wets down dust and rust in mains*

CARBOSEAL Anti-Leak solves these problems easily and economically too. And, it has kept joints tight for up to 23 years.

Get full details on CARBOSEAL Anti-Leak. Write for booklet 4506. A 16 mm. color-sound movie, "CARBOSEAL Anti-Leak Stops Gas Main Leakage" is available upon request. Better yet, give George a call. He'll be glad to tell you how CARBOSEAL Anti-Leak can mean increased profits for you.

CARBOSEAL ANTI-LEAK

Union Carbide Chemicals Company
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.
In Canada:
Union Carbide Canada Limited, Montreal

"Carboseal" is a registered trade-mark of Union Carbide Corporation.

Thomas Moody
Dresser

Charles Hodgdon
DeZurik Sales

LOOMIS, who became president of South Brooklyn Savings Bank on Jan. 1.

ELIS PETERSEN has been named superintendent of purchasing, a new post, for North Shore Gas Co., Waukegan, Ill. Mr. Petersen will celebrate his 40th year with the company on May 1.

Six executive promotions have been made by Dresser Industries Inc., Dallas. R. E. REIMER is now executive vice president and will continue to serve as treasurer; JOHN LAWRENCE also was named as an executive vice president. He recently resigned as president of Joy Manufacturing Co. to join Dresser as a vice president. THOMAS L. MOODY was appointed vice president in charge of industrial relations. J. DOUGLAS MAYSON succeeds Mr. Reimer as secretary and CECIL C. HILL and PAUL E. BRODERICK were made assistant treasurers.

DeZurik Sales Co. has moved into new offices in Summit, N. J. and named CHARLES HODGDON regional sales manager. Mr. Hodgdon has for the past two years been a sales engineer in the home office of DeZurik Corp. in Sartell, Minn. In addition to supervising the activities in the New York-New Jersey area, Mr. Hodgdon will work with representatives in Baltimore, Philadelphia, Boston, West Hartford, and Syracuse.

The following changes have been made in the gas department of Public Service Electric & Gas Co., Newark, N. J.: H. WHITCOMB NICOLSON, formerly general superintendent of gas distribution, is now assistant to the vice president in charge of gas operation. CHARLES R. DEWHURST succeeds Mr. Nicolson. CARROLL D. JAMES succeeds Mr. Dewhurst as industrial relations manager and L.

Now this Popular

self-contained 1" to 2"

RIDGID 65R-TC

offers you 3 exclusive advantages

1. Only die stock with True-Centering workholder—no more crooked threads, no time or pipe wasted.
2. Only Jam-Proof die stock—automatic kick-out after standard thread is cut by hand or power.
3. Threads 4 sizes of pipe with 1 set of dies—quick size change. Dies for stainless steel available.

See 65R-TC before you buy—
at your Supply House

The Ridge Tool Company • Elyria, Ohio, U. S. A.

MARTIN HARRIS moves from distribution staff engineer to manager of methods.

NORMAN E. HATHAWAY has been elected director and vice president-marketing for Oronite Chemical Co., San Francisco. Formerly Oronite's general sales manager, Mr. Hathaway succeeds MILTON L. BAKER, who has retired.

H. CLAY OLIVER has been appointed general superintendent of Fulton Sylphon division of Robertshaw-Fulton Controls Co. Mr. Oliver joined the division in 1955; in 1956 he was named assistant production control manager and shortly after became purchasing agent.

Dan Gannon
Mueller Co.

Ross Walker
United Gas

C. A. Sweningsen
SoCounties

J. E. Stegelin
Reynolds Gas

L. W. DARLING has been named general sales manager of Davey Compressor Co., Kent, Ohio.

GEORGE F. BURLEY has been elected vice president for purchasing and traffic of Crane Co., Chicago. He succeeds LUCIEN W. MOORE, who has resigned because of ill health. Mr. Burley most recently was director of purchases for Warwick Manufacturing Co.

J. E. STEGELIN has joined Reynolds Gas Regulator Co., Anderson, Ind., as sales engineer in the Kansas City territory. He succeeds the late H. D. MEUFFELS. Mr. Stegelin has spent 22 years in the natural gas and propane gas utility field.

In charge of the newly activated construction department of Southern Counties Gas Co., Los Angeles, is CHARLES A. SWENINGSEN. Also promoted as part of the move were JOHN MCCOLLUM, supervisor, construction procedures, and FRANK MESSERSMITH, supervisor, construction quality. Mr. Sweningsen was formerly a construction engineer and the other two men were construction analysts.

ROSS WALKER, manager of United Gas Corp.'s Mississippi coast district, has been promoted to assistant manager of the company's Beaumont (Texas) division. Mr. Walker has been with United Gas for 20 years.

DAN R. GANNON has been appointed general sales manager of Mueller Co., Decatur, Ill. Mr. Gannon joined Mueller in 1929 as a sales representative. In 1953 he became Southwest sales manager, in 1955 was named western sales manager, and last year was named field sales manager.

E. R. P. engineers use modern methods to get design data for a pipeline cathodic protection system. This group is making current requirement tests for designing a ground bed.

E.R.P. DESIGNS CATHODIC SYSTEMS
That Give Maximum Pipeline Protection

E. R. P. corrosion engineers are trained specifically in cathodic protection techniques. They evaluate all pertinent data *before* designing a pipeline cathodic system. *After* design and installation, continued E. R. P. surveys help maintain the efficiency of the system. They warn of environmental changes that affect complete protection.

Cathodic protection is, after all, like any tool. It requires skill and knowledge to use the tool successfully.

The cost of a cathodic system should always be measured by the savings achieved through maintaining full corrosion control, not just by the first cost of the system. On this basis E. R. P. designed cathodic systems give maximum savings for each dollar spent. For full information about E. R. P. cathodic protection for pipelines write for Bulletin E-43.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
30 MAIN STREET, BELLEVILLE 9, NEW JERSEY
CABLE: ELECTRO, NEWARK, N. J.

Deaths

JOHN C. HAMILTON, president of the Arkansas Louisiana Gas Co., died in December following surgery. Mr. Hamilton became president of Ark La late in 1955 after a 36-year career with the company and its predecessors. He entered the natural gas business in 1919 as assistant comptroller of the old Arkansas Natural Gas Co. After the merger which created the present company, he became an authority on rates and regulations. In 1946, he became a vice president and in 1953 was made a director. Mr. Hamilton also headed two recently formed subsidiaries, Ark La Air Conditioning Corp. and Arkansas Cement Corp.

E. RAYMOND SHEPARD, 77, inventor of the Shepard rods and a recognized contributor to corrosion control in the gas and other industries, died recently. In 1950, Mr. Shepard retired as principal geophysicist in the office of the Chief of Engineers, U. S. Army. He began his career with the Bureau of Standards in 1914 where he became a recognized authority on underground corrosion and geophysics. Later he became a consulting engineer in Chicago and developed several instruments for subsurface exploration.

FRANK E. RICHARDSON, well known pipeline and oil refinery consulting engineer, died recently in Shreveport following a lengthy illness. At the time of his death, Mr. Richardson was associated with Brown & Root, Inc. In 1947 he was assigned to the newly organized Texas Eastern Transmission Corp. as a project engineer in connection with the conversion of the Big Inch and Little Inch from liquid to gas. Since that time he was located in Shreveport. During World War II, Mr. Richardson participated in the design of both lines.

ADRIAN VAN SINDEREN LINDSLEY, retired sales vice president of the Connecticut Light & Power Co., died recently at his home in Watertown, Conn., after a long illness. Mr. Lindsley played a vital role in the development of the dual service gas range in the early 30s, a period when he was chairman of the kitchen heating committee of the New England Gas Association.

For big jobs.. little jobs.. *scattered jobs*

Whatever your work schedule may call for, from mainline extensions and pipe reclamation to small scattered service connections, Parsons utility-size 88 Trenchmobile has plenty of production capacity to fill the bill. This fast working trencher digs up to 14½ feet of trench per min., 8 to 16 inches wide and at depths to 5 feet. Its self-sharpening "Tap-In" teeth assure maximum digging efficiency at every depth, width, in all materials. Hinged crumber sweeps trench bottom clean, ready for pipe.

Service connections

On house-to-street service connections Trenchmobile undercuts walks, curbs, cross-pipes, saves you costly hand clean-up. It also makes vertical set-ins, flush with foundations. Hinged crumber swings up, out of the way — positive down-crowd boom starts cut fast, holds accurate grade. With shiftable, reversible spoil conveyer you work close to trees, hedges, poles, fences and other side obstructions. Add 6-foot blade (optional), and Trenchmobile backfills its own trench — does entire job with one-man, one-machine economy.

Drives anywhere

Mobility on rubber steps up work schedules on widely scattered jobs. Trenchmobile drives over streets and highways at 12.6 mph. There's no waiting for trailer — no loading or unloading delays.

How about a Trenchmobile demonstration on your work? Parsons distributor will gladly arrange it. See him, or write us. (Also check Parsons big crawler Trenchliners®.)

mail to: **PARSONS Company, NEWTON, IOWA** *(Division of Koehring Co.)*

Send us latest bulletin on rubber-tired 88 Trenchmobile®.

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COMPANY_____ DIV._____

STREET_____

CITY_____ STATE_____ P792 GAS

WELSBACH
"SAFE-GARD" GAS STOP
TAMPER-PROOF EASY RE-LUBRICATION DURABLE

Lock Wing "Safe-Gard" Gas Stop... Cast Iron Body, Bronze Plug with Lubricant Channels. Flat Head Type, Catalog No. G 551... 125 p.s.i. max. pressure... Sizes ¾" to 2". Tamper-proof design is so simple, yet so positive and far superior to anything else on the market. The key cannot be removed or blown out, even if broken in two at the gasway by unauthorized personnel. Grease plug is at top of valve for utmost relubrication convenience. "Safe-Gard" feature: the holding screw is permanently concealed from view, in fact, only microscopic examination reveals evidence of this camouflaged recess in the casting... see for yourself by asking for your copy of the WELSBACH-Kitson Catalog.

HIGH PRESSURE GAS VALVE
EASE OF OPERATION, NO EXPOSED NUTS OR BOLTS, BRONZE TO BRONZE, NO LUBRICATION REQUIRED

Tamper-proof High Pressure Gas Valve, metal to metal seating, max. pressure 200 p.s.i. 1" Inlet and Outlet, inside iron pipe thread. These valves have no exposed bolts or nuts. When the valve is in full open position, the upper bronze to bronze back seat eliminates all surface line pressure on the packing. Superior design and individual inspection insures against gas leakage or binding... there are truly no better, if as good, valves than those by WELSBACH-Kitson! Write for the detailed Catalog.

The name WELSBACH has stood for Quality and Dependability for more than 80 years.

WELSBACH

THE WELSBACH CORPORATION
WESTMORELAND & STOKLEY
PHILADELPHIA 29, PENNA.
Kitson Valve Division

GAS news

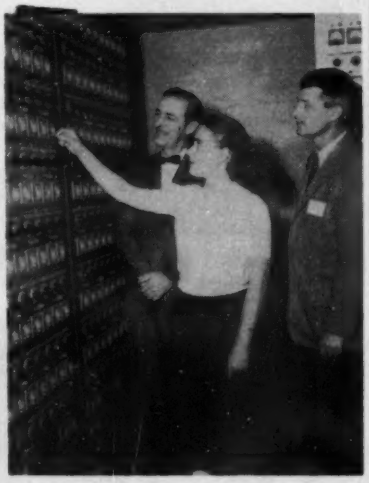
Union Gas of Canada acquires new properties

Union Gas Co. of Canada Ltd., Chatham, Ont., is acquiring all the natural gas production, transmission and distribution properties operated by Dominion Natural Gas Co. in Ontario.

At the same time, Provincial Gas Co. Ltd. will acquire that portion of Dominion Natural operating in the counties of Lincoln and Welland in the Niagara Peninsula.

Principal cities served by Dominion are Kingsville, Leamington, St. Thomas, Woodstock, Ingersoll, Paris, Brantford, Galt, Preston, Hespeler, Simcoe, Tillsonburg, Delhi, Dunville, St. Catharines, and Port Colborne.

It is expected that all prelimi-



Worcester (Mass.) Gas Light Co. president, Richard G. Rutherford (left) watches demonstration of McIlroy Fluid network analyzer given by 17 Massachusetts gas companies to Tufts College in Medford. Explaining some of the capabilities of the analyzer to Mr. Rutherford and Ashley Campbell, dean of the Tufts College Engineering School (right) is Judith Ann Keller, outstanding engineering student at Tufts.

CUT COSTS ON UNDERGROUND PIPING JOBS

...with a GREENLEE PIPE PUSHER

Installing pipe underground is quick and simple this way. With a GREENLEE Hydraulic Pipe Pusher *one man* pushes pipe through the ground—under streets, railways, walks, lawns, floors. Saves time, cuts costs through elimination of extensive ditching as just a short trench accommodates the Pusher. No tearing up of pavement, lawns, floors... eliminates tunneling, back-filling, tamping, repaving. Cuts job time to a fraction. Pusher often pays for itself through timesavings on first job or two.

No. 700 GREENLEE PUSHER For 3/4 to 4-inch pipe. Six speeds—5,600 to 40,000 lbs. pushing pressure.

No. 795 GREENLEE PUSHER For pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. Six speeds—25,000 to 150,000 lbs. pushing pressure.

POWER PUMP For both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.

GREENLEE

Get facts on timesaving Greenlee tools now. Write Greenlee Tool Co., Division of Greenlee Bros. & Co., 1942 Columbia Avenue, Rockford, Illinois, U. S. A.

nary details will have been cleared to permit transfer of the properties by March 31.

Northern Illinois trims more from heating list

Approximately 22,700 heating customers were added to Northern Illinois Gas Co.'s list late last year.

Marvin Chandler, Northern Illinois president, reports that enough gas will be available on the coldest days to serve the new heating customers as well as the more than 240,000 who now heat their homes with gas.

About 110,000 customers are still on the waiting list for gas for heating. If Natural Gas Pipeline Co. of America gets FPC approval and clearance of other legal obstacles, Northern Illinois' gas supply will be increased. Then the company can look forward to receiving a 45 per cent additional daily supply sometime during the 1958-1959 heating season. At that time, most of the waiting customers will receive gas heat authorizations.

General Controls forms electronic control section

General Controls Co. has formed a new electronic controls division for missiles, aircraft and industrial production.

The division, already in operation at the main Glendale, Calif., plant of the company, will design, produce and market high performance analogue servos for position and velocity control and control system computation, transistor and magnetic amplifier packages and other control devices.

John E. Flickinger will act as sales manager. Chief engineer is Frederick Marsh.

Arkansas PSC orders study of city taxes

Arkansas' Public Service Commission has ordered a study of special taxes paid by Arkansas Louisiana Gas Co. to the cities in which it operates.

The commission told Ark La to present information on these taxes along with any recommendations it might have for preventing discrimination between towns on its franchise tax bills. A resolution adopted by the PSC said there was a great inequality in the amount of taxes levied by the cities. And, that in many instances the amount

Cut Steel or Cast Iron Pipe up to 12" EASIER and FASTER

WITH THE NEW REED

HINGED 4-WHEEL PIPE CUTTER

- Closed Frame Construction assures complete rigidity with less weight.
- 4-Wheel design needs minimum swing of handle.
- 4-Point pipe guide aligns cutter for perfect tracking of wheels and a right angle cut.
- Quickly interchangeable wheels for steel or cast iron.
- Needs only 3" space to pass under 12" pipe.

• For ditch work or similar close-quarter operations these new Reed Cutters are practically indispensable and fully justify replacing whatever cutting equipment you are now using.

You can, for example, cut 8" steel pipe in less than five minutes, and cast iron pipe even faster.

Available in five sizes for steel or cast iron pipe from 1" to 12".

FOR FAST TURNING IN TIGHT SPOTS—
USE THE IMPROVED REED CHAIN WRENCH

Handles range from 10" to 60" in length.

You can tighten up or "back off" without taking wrench from pipe.

These improved chain wrenches will do anything an ordinary pipe wrench will do . . . and do it easier, better and faster. Ideal for ditches or tight corners.

Grip securely with no play, yet they have a ratchet-like action.

REED

Unconditionally guaranteed to be the best cutting tools you have ever used. See your jobber or write for literature.

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STOP H_2S CORROSION BEFORE IT STARTS!

The Connelly IRON SPONGE purification process at the well site removes hydrogen sulphide BEFORE the gas is piped to central processing. Thus, the cause of pipe line corrosion is eliminated because corrosive gas never enters the transmission lines. Additionally, Connelly IRON SPONGE eliminates the need for extreme close control. It operates with high efficiency at low or high pressures—absorbs more H_2S, gives longer service between foulings and is easily regenerated. If you have a purification problem check this MOST ECONOMICAL solution today. Write for Field Processing Bulletin #OG-7.

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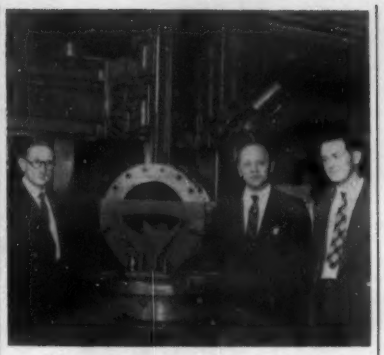

Visiting the DeZurik Corp.'s plant in Sartell, Minn. recently were representatives of Millspaugh Ltd., Sheffield, England, manufacturers of DeZurik products for the British and European markets. Pictured in the plant are (from left): Fred Massey, superintendent of the Millspaugh operation; David DeZurik Sr., president of the Minnesota company; and Robert Vohs, manager of the Millspaugh operation.

of the tax has no relation to the size of the town, the number of utility customers, or the amount of revenues derived by the utility from within the city.

The PSC also noted that the amount of taxes paid by Ark La had increased since the company's statewide rate schedule was fixed in 1954 and that these increases might have resulted in discrimination between towns or between classes of customers.

Sports cars to go to best sales-clinchers

Retail gas range salespeople whose demonstration techniques are selected as the best "Burner-With-A-Brain" sales-clinchers are in line for five style-leading 1958 American sports cars.

The Thermostat division of Robertshaw-Fulton Controls Co. is conducting a nationwide contest to find the best sales clinchers.

M. B. Gault, sales manager of the division, said that only retail salesmen and saleswomen working for any type of gas appliance dealer or gas utility are eligible to win.

Reasons behind the contest: Robertshaw thinks the contest is a sound way to give component manufacturer support at the point-of-sale to the sales promotion efforts of dealers and utilities. The company wants to find out what advertised consumer advantages of the Burner-With-A-Brain have been

DIG MORE DIRT FOR LESS MONEY WITH A Pow-R-Ditcher

Model 4T Pow-R-Ditcher

Here's a real workhorse that digs for LESS because it costs so much LESS! Ideal for the light construction field in laying gas pipe, water and cable lines and digging home foundation footings. Very maneuverable for those "tight spots", the 4T is only 6' high, 13' long and 48" wide. Digs 6" to 14" wide and up to 17' per minute. Handles most small ditching jobs at a fraction of the cost of more expensive ditching machinery.

"Small W-2 Pow-R-Ditcher is Finest for Small Services"

. . . says Post and Lee Service of Alta, Iowa. "In one month we completed over 100 services (7100 feet). It was rugged work but the W-2 handled it with no breakdowns except a pair of belts. We keep ahead of schedule with the W-2." The W-2 digs 2½" to 4" wide and is ideal for gas service, electrical service and shallow water lines.

Write For Literature and Low Prices on the Complete Vermeer Pow-R-Ditcher Line

Larger Pow-R-Ditcher models also available. Check the performance, quality and price before you buy. Our nearby Vermeer dealer will be happy to arrange a demonstration.

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found most useful. And, third, Robertshaw wants to learn what demonstration techniques are being used most successfully and whether salespeople have developed their own new sales-clinching demonstration ideas.

Northern Illinois plans new financing

Feb. 19 has been tentatively set as the date when Northern Illinois Gas Co. will launch its $10 million financing.

Company President Marvin Chandler said the new funds will be part of the estimated $85 million of new capital required for the company's projected $125 million five-year (1958-62) construction program. This outlay will provide for the new customers Northern Illinois expects to connect during that period.

About a quarter of the $125 million has been included to provide for the possibility that underground storage facilities may be located and developed in line with the company's efforts.

Portland Gas closing byproducts operation

Portland (Ore.) Gas & Coke Co. will shut down its byproduct operations soon. The move will reduce its oil-gas plant in North Portland to a minimum standby facility.

James F. Bell, executive vice president, in reporting the decision to close the plant, explained marketing prospects for Gasco's petrochemicals, particularly electrode pitch, are so weak that heavy operating losses at the plant would have been inevitable.

Gasco's largest job reductions will take place after April 1, and the plant will be on a standby basis by mid-June, according to present plans. There are no plans to dismantle the plant.

Columbia tells storage story in motion picture

Columbia Gas System has produced, with the assistance of the Jam Handy Organization of Detroit, a new motion picture, "The Underground Story of Natural Gas."

Told in layman's terms is how natural gas is transported from the wells in the Southwest through

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Baso Type R single-flame pilot burners give dependable service ... maintain stable millivoltage output over a wide range of pressures ... provide trouble-free performance with any kind of fuel gas.

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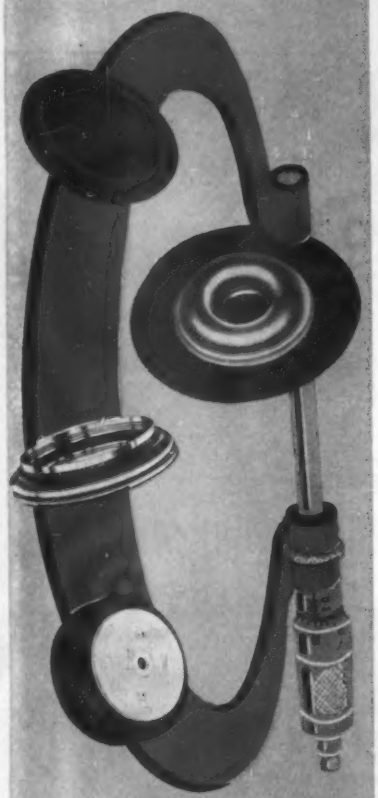

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2000 miles of pipelines to the East, and then stored in natural reservoirs for use when needed. The sound-and-color film shows what goes on beneath the ground first by showing natural conditions that account for gas in the rocks of the earth. The "lost world" atmosphere of its ancient origin is created by means of realistic miniatures, complete with dinosaurs and their accompanying roars, as imagined by the sound technicians.

Three-dimensional techniques show how long-abandoned wells are reconditioned and then used again for the storage of gas.

To make possible wider use of the film, there are two versions, 27 and 13 minutes in running time.

AGA calls off air conditioning meetings

A series of symposium meetings on gas air conditioning has been cancelled because of the industry's enthusiastic support of the AGA's air conditioning program.

W. W. Selzer, chairman of the AGA air conditioning promotion committee, said the association called off meetings in January and the following February dates: Feb. 4 in St. Louis; Feb. 7 in Los Angeles; Feb. 12 in Dallas; and Feb. 14 in Birmingham.

When the promotion committee was established last June, one of its primary goals was to stimulate utility sales programs in 1958. It was hoped that at least 4600 direct-fired residential gas absorption air conditioning units would be sold. Utility commitments for 1958 have already surpassed this goal by more than 50 per cent.

The promotion committee is concentrating now on producing an effective how-to-do-it plan book of action for utility air conditioning programs. This plan book, "Steps to Success," will include material originally scheduled for the symposiums as well as data assembled by the AGA commercial and industrial air conditioning subcommittee. It will also include studies on the importance of gas air conditioning and an important new survey made on the low service cost of direct-fired gas absorption equipment.

Also scheduled for this year is an extensive advertising program. More than 40 full page ads on gas air conditioning will appear in national magazines.

Southern Union serving uranium mills and mines

Uranium mills and mines in the heart of the country's richest uranium ore deposits near Grants, N. M., will benefit from construction started by Southern Union Gas Co.

A pipeline to supply natural gas to the uranium mills will extend for about 20 miles northward from a 30-in. El Paso Natural line located northwest of Grants. Construction will include 2.5 miles of 6-in. line from the El Paso meter station to a point where Southern Union will install meters for ser-

In limited production is Rockwell Manufacturing Co.'s new 180,000-sq ft plant at Kearney, Neb. About 75 employees are at work in the new $2 million plant located on a 52-acre plot. Made at the plant are Rockwell-Nordstrom lubricated plug valves.

Newest gas ranges for newest apartments

A huge $16 million apartment house project aimed at easing housing shortage in the rapidly growing industrial center of San Diego, Calif., will feature built-in gas appliances—so new that they haven't been seen by consumers.

According to John L. Hall, Southern California sales manager of Utility Appliance Corp., the 1060 apartment units in the Loma Palisades development will be individually equipped with Gaffers & Sattler's Balboa-model built-in gas ovens and tops, Mission glass-lined water heaters, and Utility furnaces. Top burners use a new air intake design that eliminates air baffles on the front of the cabinet.

The development on Point Loma overlooks colorful Mission Bay. The fast-growing San Diego area claims a population of more than 1 million with San Diego proper placed at more than 500,000.

vice to the Homestake Mills. The line will then go northward about 7.5 miles and become 4-in. size. It will extend to mills and mines worked by Kermac Uranium Ore, Phillips Chemical Co., and Homestake Sapin Mine.

Southern Union's plans also call for extension of lines to bring gas to the town of Milan, bordering on Grants air field. When the line is completed, Southern Union will turn gas on to about 67 homes and business. About 200 more homes are slated for the area this spring.

Air conditioning study published by IGT

As a result of the great growth of the gas industry and its need for increased summer consumption of gas, air conditioning research has drawn the attention of many investigators in recent years.

The absorption cycle has proved of such importance in this respect that it merits continued development. But, the dearth of literature on this cycle has made it hard for

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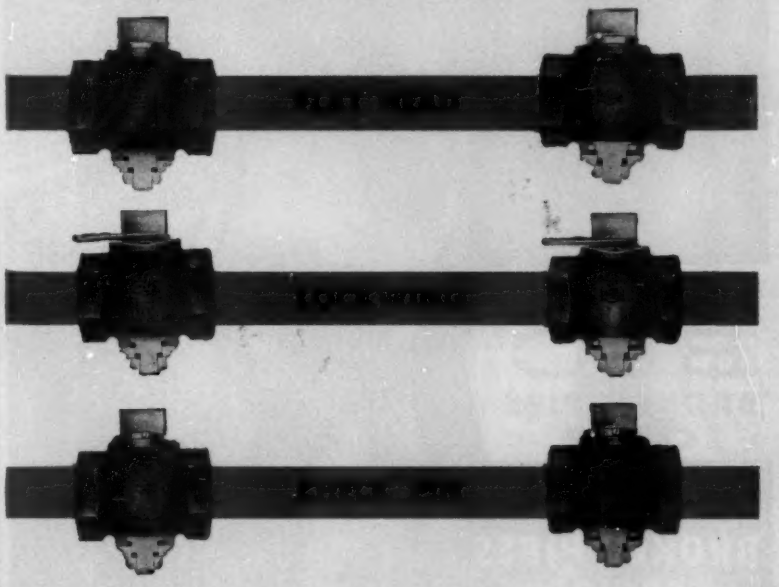
SERVICE LINES • MAINS • APPLIANCES

REGULAR PATTERN — Full Range of Sizes — "KEY-LOK" TAMPER PROOF

Iron Body with Brass Plug ... Black or Galvanized



Quality Assured — By Precision Machining ... Individual Testing ... Rigid Inspection

Quality Proven by Supplying the Gas Industry for Over 80 Years

Hays also manufactures a full line of all brass stops

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Another Hays First
for Easy Handling ... Space Saving Storage

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new investigators to work in the field without duplicating much of the research done by others.

That lack of information prompted the AGA's task group for air conditioning to initiate a study at the Institute of Gas Technology. This literature search covered the theory of the closed absorption cycle, applications of the cycle, the chemical and thermodynamic properties of absorbents and refrigerants, and factors to be considered in attempts to develop improved absorbent-refrigerant combinations.

Here is one of a growing training school fleet operated by Robertshaw-Fulton Controls Co. The live, working controls being unloaded are used in Robertshaw's training school on wheels. Instructors answer questions and point out the what, where, why and how's of control systems. Attending the schools across the nation have been utility servicemen, master plumbers and apprentices, distributor-dealer groups, heating contractors, heating installation and servicemen.

The results of this study have been published in IGT Research Bulletin 14, "The Absorption Cooling Process—A Critical Literature Review," by R. T. Ellington, G. Kunst, R. E. Peck and J. F. Reed.

The bulletin presents a review of the closed systems currently employed in domestic and commercial air conditioners and tabulations of physical and thermodynamic data for the absorbent-refrigerant combinations used. Appended is an extensive cross-indexed compilation of literature sources of data on many combinations which have been considered.

Hydrocarbon subsidiary formed by Columbia Gas

Columbia Gas System has formed a new subsidiary to own and operate a fractionation plant in Siloam, Ky. The new company is known as the Columbia Hydrocarbon Corp.

The plant is now under construction. Raw materials for its operation will be carried through a 35-mile line from Kenova, W. Va., where United Fuel Gas Co., another subsidiary, is building a plant to extract hydrocarbons from natural gas.

Ultimately, the Siloam plant is expected to produce 206.5 million gal. annually of ethane, propane, butane, and natural gasoline.

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BPC*
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BROKEN PIPES REPAIRED in minutes!
For permanent repair, simply install beside break, slide over, and tighten . . . Stainless Steel bands, Neoprene Gaskets. Write for literature.
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A Universal Tar Emulsion Breaker
Eliminate tar emulsion "headaches"
Produce dry tar efficiently
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Proved in use by over 100 Gas Companies
Write for information and sample.
UNIVERSAL CHEMICALS CORPORATION
Lonsdale, R. I.

GAS • News Notes

St. Louis television viewers saw and heard their first live TV show in stereophonic sound during Christmas week. The half-hour show was sponsored by Laclede Gas Co. and was the first of its kind ever attempted in the St. Louis reception area. According to Laclede's advertising manager, William H. Otto, additional stereophonic telecasts are under consideration.

Locke Stove Co., Kansas City, Mo., has bought the Moore Gas Heater division of Conlon-Moore Corp., Joliet, Ill. Locke will continue the manufacture and sale of Moore's gas heaters in addition to its own Warm Morning heater and incinerator lines.

Eclipse Fuel Engineering Co., Rockford, Ill., has acquired exclusive rights to patents, manufacturing and sales of the vane-type indicating flowmeters developed by R. A. Ekstrom & Co. Five basic styles for gases and liquids are included in the line.

Metalbestos gas vent pipe and fittings will be made and distributed in Canada by Selkirk Metal Products Ltd., Winnipeg, Manitoba, and Selkirk Metal Products (Eastern) Ltd., Brockville, Ontario. Alan Kinkead, president of the William Wallace Co., Belmont, Calif., made the announcement.

Dr. B. D. Thomas, scientist and research administrator, has been named to the presidency of Battelle Memorial Institute in Columbus, Ohio. He succeeds Dr. Clyde Williams, who has retired.

Forty supervisory and operating personnel from gas utility and pipeline companies attended a recent gas conference at Fisher Governor Co., Marshalltown, Iowa. Selection, sizing, and design considerations in gas regulators were discussed by Fisher engineering and sales personnel.

Texsteam Corp., Houston, has purchased the assets of Graham-Lemunyon Corp., Los Angeles. Texsteam, a subsidiary of Vapor Heating Corp., Chicago, has been selling the Graham plug valves for the past three years.

THE *FINEST* FOR MODERN GAS DISTRIBUTION SERVICE

NORMAC

Malleable Couplings

Normac Insulating Malleable Couplings and fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets.

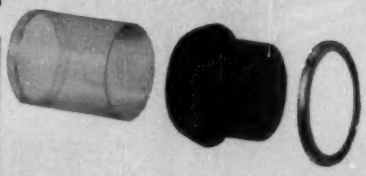
Insulating Couplings AND Fittings

Malleable Service Ell

The insulating principle depicted above is carried out in all Normac Ells and Tees.

NORTON McMURRAY has specialized for 20 years in the development and production of products solely for the Gas Industry. Whether your plans include modernization, or new, expanded facilities, Normac Gas Distribution Equipment will serve you well.

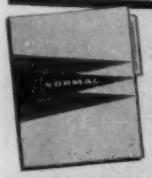
Insulating Gaskets



The Normac insulating principle incorporates an efficient combination of a polyethylene sleeve and a semi-insulating gasket or full rubber gasket and retainer ring.

Brass Fittings

Normac insulating Brass compression end Tees, Ells and all compression end fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets in ¾", 1" and 1¼" iron pipe sizes.



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ONLY $189.50
with indestructible Fiberglas cabinets.

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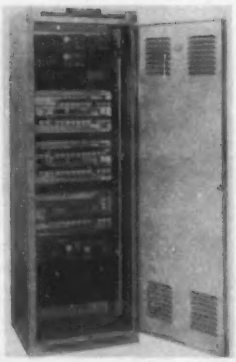
Geophysical Instruments Since 1932

Send for FREE 1958 CATALOG Complete Pipe Finding, Leak Detecting and Corrosion Control Equipment.

GAS DIGEST

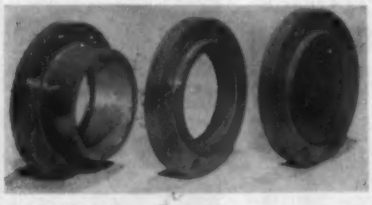
New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 101, 102



1. Supervisory system

Hammarlund's new pulse-width selection system permits 860 functions on a single carrier. The PWS system is an all-relay design. Each system is custom assembled to fit specific needs. Especially adaptable to the remote supervision of gas pipelines, the system's signal carrier may be either ordinary voice-quality telephone lines, special lines, or radio links.
Hammarlund Manufacturing Co.



2. PVC pipe flanges

Molded 6- and 8-in. PVC pipe flanges are available from Luzerne Rubber Co. for use in PVC and other plastic pipe installations. Threaded, socket, blind and reducing flanges are available in both 6- and 8-in. size of Type I (normal impact) or Type II (high impact).
Luzerne Rubber Co.

3. Rotary compressor

Standard equipment on Jaeger's 600 rotary compressor includes two-pass exhaust muffler, automatic blowdown valve and swing-type check valve. Copper tube finned multi-pass air cooler, adjustable radiator shutters, wrap-around bumpers, automotive steering axle, and lifting bail are also featured. Full load speed is only 1650 rpm, enabling the machine to average an output of 600 cu ft of 100 psi air per 1.2 lb of fuel.
Jaeger Machine Co.

4. Cutting accessory

A new flexible shaft has been added to H&M Pipe Beveling Machine Co.'s line of accessories for pipe cutting and beveling machines. The flexibile shaft allows complete visibility of the cutting or beveling operation. It is especially useful when cuts or bevels are being made on larger sized pipe, where the operator has difficulty watching the cut from his normal position.
H&M Pipe Beveling Machine Co.

5. Pipe plugs

Slip-proof, cross-slotted headless pipe plugs have been developed by Pipe Plugs Inc. Leakers are eliminated by using cold-rolled, cold-formed Dryseal thread. The pipe plugs are available in a wide range of sizes in steel, aluminum, brass, stainless steel, and Everur. They come in breather vents with porous bronze insert, or permanent "Alnico" magnet attached.
Pipe Plugs Inc.

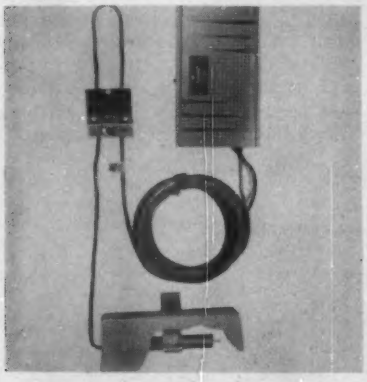
6. Chromatograph Readout

SIE's new unit provides instantaneous, integrated, digital readout of the signal peaks produced by chromatographs currently being used for quantitative natural gas

analysis. The time-consuming measurement of peak areas by planimetry is eliminated. The unit is designed to accept an input signal directly from the sensing bridge in a chromatograph. This signal is amplified, accurately integrated, and displayed on an impulse counter with an electrical zero reset.
Southwestern Industrial Electronics

7. Furnace

Holly-General Co. has added the "Mighty Mite" to its line of heating equipment. This 58,000-Btu gas forced air furnace is only 10 in. wide. It requires 1 ft or less of space. This feature is valuable when modernizing older homes. Equipped with an automatic wall thermostat, all integral controls are factory wired, including the summer ventilating switch.
Holly-General Co.

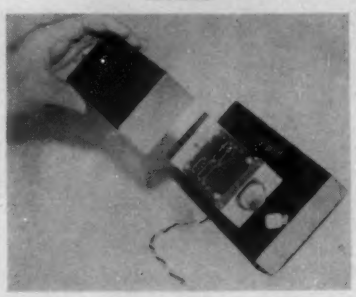


8. Reset thermostat

With the "3W" Weather-Flo, it is possible to provide a continuous, gentle flow of heat, modulated in temperature with each degree change in outdoor temperature. According to Automatic Devices Co., in place of the start-stop flow of heat, the 3W gently raises the temperature of heat flowing with each fraction of a degree drop in house temperature. The control works with all types of hot water or warm air heating systems.
Automatic Devices Co. Inc.

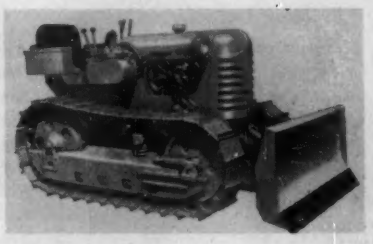
9. Gas vent elbow

Turns of any angle from zero to 90° are possible with Dura-Vent's flexible gas-vent elbow. One of the new features of the one double-wall, air-insulated elbow is the continuous insulating air space between the inner and outer walls. Although the elbow is in three sections that can be rotated with respect to each other, by novel design the air space is not interrupted at either joint. This prevents formation of hot spots.
Dura-Vent Corp.



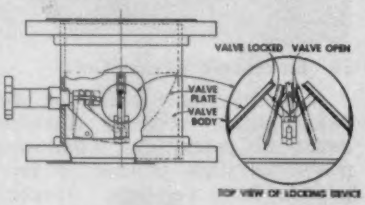
10. Radio power supply

Du Mont is offering a 25-watt "piggy back" transistorized power supply for existing two-way radio equipment. More than 80 per cent efficiency is guaranteed with the supply. According to the company, the new power supply furnishes total standby receiver high voltage, thereby decreasing the standby drain of the mobile unit's receiver section.
Allen B. Du Mont Laboratories



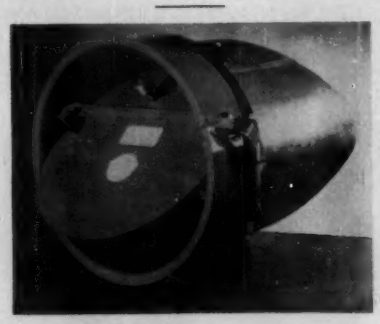
11. Crawler tractor

Among new features available in the Oliver line of construction equipment is the new trencher attachment for the OC-4 crawler tractor. Also, this model will offer versatile mounted attachments, including a hydraulic side boom for pipeline work. In other models in its crawler-tractor line, Oliver will offer more sizes and types.
Oliver Corp.



12. Check valve

A recent change in the Technocheck valve provides a device for locking the valve in the closed position. The new features give protection where sticking of the valve in the open position may cause disruption of processes or service. The device is arranged so as to have no fixed connection with the valve. Locking is accomplished by a cam mechanism which rotates against valve members to hold them closed.
Techno Corp.



13. Draft control

A three-fuel draft control has been designed to solve problems peculiar to commercial-industrial applications. H. D. Conkey's new draft control (M+MG2) serves gas, oil, oil-gas with equal efficiency. It requires only minor, on-the-job changes to adjust from one fuel to another. The control serves furnaces and boilers with flue outlets from 10 in. to 32 in., both natural and induced draft.
H. D. Conkey & Co.

14. Crucible furnace

Selas Corp. has developed a compact crucible furnace for the lab. It can be used for small melts and for testing of small samples at temperatures up to 2650°F (1455°C). Fired by any available fuel gas and air under low pressure, the crucible furnace is chambered for crucibles up to 15/16-in. base diameter by 2¼-in. high.
Selas Corp.

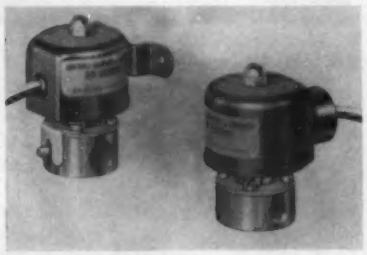
15. Aluminum valves

Gate valves of aluminum alloy are offered by Darling Valve. Sizes available currently range from ½-in. through 24-in., and include types for every requirement where

aluminum piping systems are now being used or are planned. The Darling-developed principle of fully revolving double disc parallel seat gate valve operation is used in the aluminum alloy valves.
Darling Valve & Manufacturing

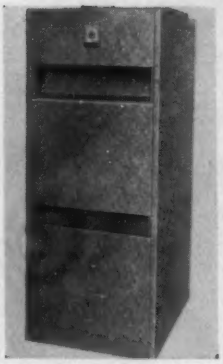
16. Vented room heater

The Brilliant Fire Continental II series of vented, radiant gas room heaters has been introduced by Ohio Foundry. The heaters are available in three sizes, 35,000, 50,000, and 65,000 Btu. The cabinet fronts are framed with a anodized, gold aluminum trim strip. The heaters have all-welded, 100 per cent gas-tight heat exchangers. A "dimple-embossing" drawing process produces unusual rigidity of the heating sections and effective resistance to thermal noise.
Ohio Foundry & Mfg. Co.



17. Solenoid valve

Designed specifically for use in tight equipment corners and crevices is A-P Controls' new solenoid valve. Model 291 can be used wherever a compact normally closed valve is needed to control flow. It is available in brass or stainless steel.
A-P Controls

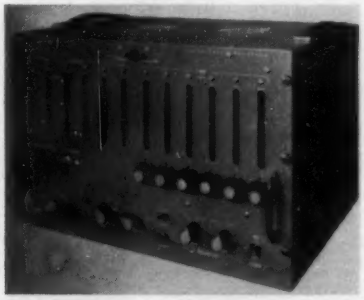


18. Winter air conditioner

American Standard's new furnace is compact enough to be tucked away in a closet or alcove yet its attractive design makes installation in a recreation room suitable. The unit is designed for 1-in. clearance to combustible material. Jacket panels are rigidly reinforced to eliminate vibrations and noise. Also featured in the furnace is the American Standard heat exchanger and built-in filter frame.
American Standard

19. New polyethylene

Greater stiffness, higher heat resistance, and greater resistance to abrasion in molded products are possible with a new medium-density polyethylene from Eastman Chemical Products. According to the company, users of extruded pipe will benefit from its ability to withstand higher pressures and temperatures.
Eastman Chemical Products Inc.



20. Electronic integrator

A new electronic integrator provides highly accurate measurements of energy by integrating power vs. time, impulse by integrating force vs. time. Allegany Instrument's system accepts analog voltage signals, digitizes by heterodyne technique, and integrates area under signal curve by counting at the rate of 10,000/second for high resolution of transient phenomena. Both integral and elapsed time are displayed digitally.
Allegany Instrument Co. Inc.

21. Power speaker

Effectiveness of two-way mobile radios is increased by extending listening range hundreds to thousands of feet. Motorola's Big Voice speaker is adaptable to two-way radio systems used in all applications. The driver hears all messages even when working away from his parked vehicle. By turning a control, the speaker is converted into a public address system with a range of a half a mile or more.
Motorola Inc.

22. Computer center

Mid-Century Instrumatic Corp.'s portable, desk-side computer has all the facilities needed for process design computation. It works in such fields as heat exchangers, catalytic cracking, proportional mixing, automatic controls. The MC-400's high precision permits its use either alone or with other computing equipment. Included in the computer center is an amplifier overload alarm; a full monitor and control panel; a fixed type program patchboard, with integrator grids to permit use of special feedback components; and color coded tip jacks.
Mid-Century Instrumatic

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February, 1958 • **Void after 90 days**

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23. Cycle billing desk

Remington Rand's new cycle billing desk offers a high filing capacity housing both active and inactive accounts. The desk features a new console design exterior and introduces lightweight, anodized aluminum trays. The desk has three tiers of filing trays—four trays across. The four-tray width allows for simple division of units for distributing workloads evenly.
Remington Rand

24. UHF base station

With General Electric's new high power UHF base station radio transmitter, dispatchers have more ability to reach vehicles traveling in outlying areas. Engineered to deliver up to 250 watts, the unit may be licensed for operation in the 450-460 mc band. The new transmitter increases power output up to 12 db.
General Electric

25. Crawler-ditcher

A new vertical boom, crawler-mounted ditcher has been added to Barber-Greene's line. The vertical digging boom of Model 784 offers many new design features. Wide variation in digging widths is achieved with a single bucket line by varying position or adding teeth to individual buckets.
Barber-Greene Co.

TRADE LITERATURE

26. Silent gas valve

Honeywell's silent, service-free V81 gas valve is the subject of a new folder. The new valve eliminates costs of installing and wiring the Pilotstat and eliminates need for periodic service.
Minneapolis-Honeywell

27. Turbine engine noise

Effective silencing of the tremendous noise of a gas turbine engine is explained in a 12-page brochure published by the industrial sound control department of Koppers Co. Ten easy steps help determine the best type of sound control unit.
Koppers Co. Inc.

28. Repair clamp

A fast, simple permanent way of repairing small leaks, cracks, and splits in steel pipelines is Dresser's Style 75 Permaclamp. The company has published an illustrated catalog showing how the Permaclap can be used in lines carrying pressures up to 1200 psi.
Dresser Manufacturing Division

29. Pipe joint wrap

L.O.F. Glass Fibers has a new brochure featuring Duratape and Duramesh pipeline joint wraps. Contained in the folder are descriptions of physical and chemical properties of both coal tar and asphalt-impregnated glass fiber products. Also, photos of typical hand-wrap applications.
L.O.F. Glass Fibers Co.

30. Couplings and fittings

Norton-McMurray has issued a new catalog showing its entire line of compression couplings and fittings. Included in the Normac catalog are new designs in brass fittings for cathodic protection.
Norton-McMurray Mfg. Co.

31. Trencher

A four-page color bulletin describes Parsons Co.'s new Model 170 Trenchliner, a wheel-type trencher that digs to 5-ft 9-in. depths, and 20 to 32 in. wide. Discussed in the bulletin are the hydraulically driven conveyor and the hydraulic tilt master.
Parsons Co.

32. Field compressors

Twenty-four different sizes of Clark packaged compressors are discussed in a new four-page brochure. Explained is the flexibility of the Clark line, which can deliver a packaged compressor tailored to exact horsepower needs in the 100-660-bhp range.
Clark Bros. Co.

33. Control school

Described as "ready to roll" in a four-page brochure is Robertshaw-Fulton's training school fleet. Utility servicemen, master plumbers and apprentices, distributor-dealer groups, heating contractors and installation and servicemen are participating in the schools. The school and its fleet of equipment-carrying station wagons is fully described in the brochure.
Robertshaw-Fulton Controls Co.

34. Laundry rating chart

Designed for those who use the laundry rating method to size automatic gas water heaters is a new laundry rating chart from Ruud Manufacturing Co. The chart lists 34 makes of automatic clothes washers and 294 different models.
Ruud Manufacturing Co.

35. Pipe coating

Details on polyvinyl chloride tape pipe coating are given in a new bulletin from Plicoflex Inc. The company's No. 340-14 (laminated) coating consists of a 7-mil polyvinyl chloride film laminated to 7 mils of black, contact bonding compounded butyl rubber.
Plicoflex Inc.

36. Meter houses

Weatherproof meter houses are covered in a new catalog published by Moran Furnace & Sheet Metal Co. Touched on in the 12-page publication is Moran's complete line, including standard, multi-door, horizontal, portable walk-in, utility.
Moran Furnace & Sheet Metal Co.

37. Mobile radio

General Electric has published a brochure on two-way mobile radio equipment. It shows equipment designed to fit individual needs and tells how today's units are engineered with future needs in mind.
General Electric

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GAS CALENDAR

February

6-7. . SGA Accounting Management Round-Table Conference—Monteleone Hotel, New Orleans.

6-7. . SGA Sales Executives Round-Table Conference — Monteleone Hotel, New Orleans.

12-14. . Ninth Annual Tulsa Corrosion Short Course for Pipeliners (Tulsa Section, NACE)—Mayo Hotel, Tulsa.

20-21. . SGA Distribution Management Conference — Roosevelt Hotel, New Orleans.

20-21. . SGA Transmission Management Conference (Spring)—Roosevelt Hotel, New Orleans.

20-21. . SGA Distribution Management Roundtable Conference—Roosevelt Hotel, New Orleans.

26. . NEGA Street Department Supervisors Group—Hotel Bancroft, Worcester, Mass.

28-29. . PCGA-AGA Western PR Workshop—Riviera Hotel, Las Vegas.

March

13-14. . Public Utilities Advertising Association—Montreal, Canada.

17-21. . National Association of Corrosion Engineers—San Francisco.

20-21. . New England Gas Association Annual Meeting—Hotel Statler, Boston.

24-26. . Mid-West Gas Association—Broadmoor Hotel, Colorado Springs.

27-28. . Oklahoma Utilities Association Annual Convention — Biltmore Hotel, Oklahoma City.

31-April 2. . GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

31-April 2. . AGA General Management Section Conference — Washington, D. C.

April

8-10. . AGA Sales Conference on Industrial & Commercial Gas—Hotel Schroeder, Milwaukee.

14-16. National Conference of Electric & Gas Utility Accountants—Shamrock-Hilton Hotel, Houston.

15-17. Southwestern Gas Measurement Short Course—University of Oklahoma, North Campus, Norman.

17-18. Indiana Gas Association Annual Meeting—French Lick-Sheraton Hotel, French Lick, Ind.

21-23 AGA Research and Utilization Conference — Hotel Carter, Cleveland, Ohio.

28-30. Southern Gas Association Annual Convention—Dallas.

29-May 1. Petroleum Industry Electrical Association Annual Meeting and Exhibit—Baker and Adolphus Hotels, Dallas.

May

5- 9. AGA Distribution, Production, and Transmission Conference—Roosevelt and Commodore Hotels, New York.

12-13. AGA Eastern Gas Sales Conference, Residential Section—Park Sheraton Hotel, New York.

12-19. AGA Mid West Regional Gas Sales Conference — Edgewater Beach Hotel, Chicago.

19-21. AGA-Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago.

20-22. Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

22-24. Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

June

10-12. 3rd Annual Appalachian Underground Corrosion Short Course—West Virginia University, Morgantown, W. Va.

15-19. American Society of Mechanical Engineers—Hotel Statler, Detroit.

23-24. Michigan Gas Association—Grand Hotel, Mackinac Island Mich.

24-27. Canadian Gas Association Annual Meeting—Manoir Richelieu Hotel, Murray Bay, Quebec.

September

2- 4. Pacific Coast Gas Association Annual Convention—Multnomah Hotel, Portland, Oregon.

5. New Jersey Gas Association Annual Meeting—Spring Lake, N. J.

October

13-15. American Gas Association Annual Convention—Atlantic City, N. J.

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Washington • *Cont'd.*

from page 17)

Court ruled that gas rates set by the FPC were not final rates, and that the Gas Act provided machinery for revising allowances as costs shifted. But that was an earlier court, in earlier times, and the experts fear that the make-up of today's high court is not likely to follow that philosophy.

If the requirement that all cases must agree to doctrine set in the Memphis case stands, the FPC will have to revise its rate-making theories to make sure costs are covered for number of years. And gas industry attorneys believe the commission might also have to initiate reviews of thousands of present rates to bring them into line with this new philosophy.

Some attorneys are pressing for the commission to initiate immediately reviews of all pending applications to prevent loss of time and refilings under the appeal court decision.

The outcome of these maneuvers, however, is almost certain over the next year or so to be an "agonizing reappraisal" of relationships between the three segments of the gas industry to protect continued supplies of gas to consumers and insure normal expansions.

The Memphis decision is reaching even beyond the immediate problems of how rates should be fixed by the government. It again tends to crack efforts for a unified gas industry. Many distributors are heartily in favor of their new "seat at the bargaining table" and the resulting veto power over pipeline and producer rate increases.

In addition, the decisions put the pipelines in a weakened position, which may break up some of the budding compromises with the coal interests over a possible watered-down amendment to the Harris-O'Hara gas bill to bring direct industrial sales under limited FPC jurisdiction.

While the Memphis case is igniting what promises to be the biggest court battle for the industry, a second court case also promises to send some gas lawyers working overtime.

This involves a Kansas state

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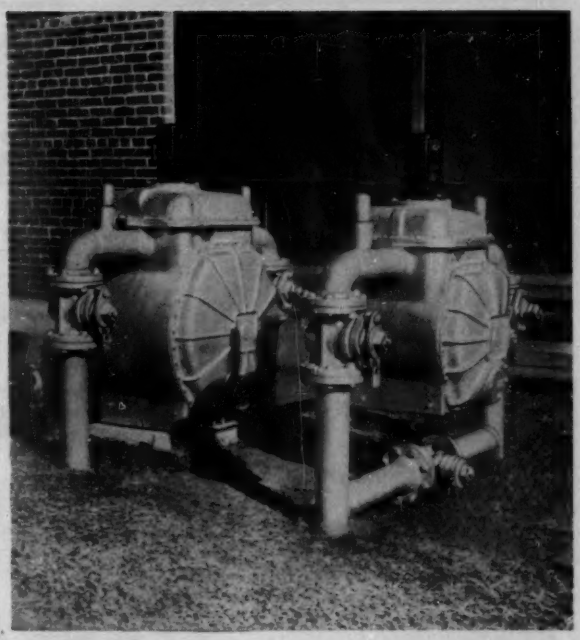

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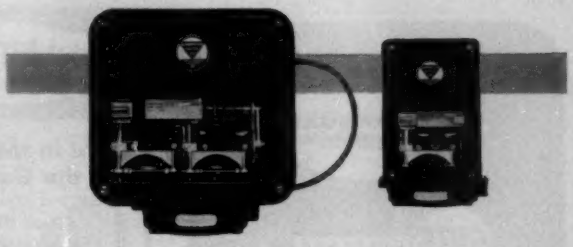

American® BASE VOLUME INDEXES register gas quantity at standard conditions of base temperature and base pressure. BASE PRESSURE INDEXES automatically multiply volume at pipe line conditions by the pressure factor and indicate quantity at base pressure on a straight reading index.

Operation of both instruments is continuous with all functions performed mechanically through special gearing. Indicated totals are always accurate.

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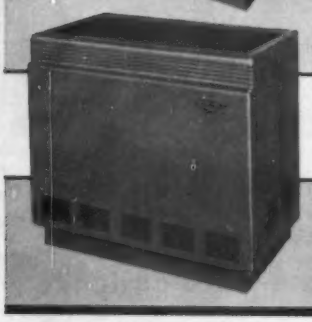

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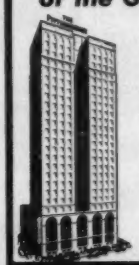

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minimum price law and the FPC's contention that gas enters interstate commerce at the wellhead and that regulation is the sole function of the federal government.

The FPC has filed a "friend of the court" brief with the U. S. Supreme Court in the case, which involves Cities Service Gas Co. and the State of Kansas. The high court ruled in 1955 in a case involving an Oklahoma minimum price law that natural gas enters interstate commerce at the so-called tail-gate of the well.

The Kansas law attempts to set minimum rate under the state's conservation powers at the wellhead. The issue is where gas enters interstate commerce, and thus whether the states have any power to set minimum rates. FPC says that by setting such minimums, the states would in effect set interstate rates too.

It's again another "nibbling at states rights, and another attempt to clamp the vise of federal control a little tighter," one gas industry spokesman comments. The oil industry is particularly worried over the outcome, and the federal government's ability to wreck state conservation laws, which are strongly enforced in oil production in several states.

In another important court test, the industry is asking the high court to overthrow federal control of sales by independent producers to a processing plant. They contend that this type of sale was not covered by the 1954 Phillips decision, and that the FPC should take control in this instance at the processing plant.

The industry had hoped to settle the issue in a case involving Saturn Oil Co. vs. the FPC, but a Denver court ruled against the producers. Now, some independent producers favor pressing the issue through another pending case, involving the Deep South Oil Co.,

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Continental Oil Co., Shell Oil Co., and Humble Oil and Refining Co.

These cases too involve the point at which the federal government can take control of natural gas, and whether it takes it at the same point in production in all circumstances.

Despite the number of vehicles the gas industry is now warming up to try to ease the pressure of what may become iron-fisted federal control, the chance of any important sucesses seem slight to many observers. ■

Regulatory Trends •

(*Continued from page* 11)

justify the application of one method instead of the other. In this proceeding, however, the allocation method should have been applied by the commission instead of the segregation method which does not conform to the facts established by the evidence. This statement of the Kansas Public Utilities Commission * * * applies to the facts shown by the evidence in this proceeding: 'The value of property used in transporting and distributing natural gas in two states may be divided upon the basis of use, in the proportion that the volume of gas used in each state, respectively, bears to the entire volume passing through the line.'

"By the action of the commission in using the segregation method, in considering only the production and transmission facilities located within West Virginia, and in excluding from consideration other such facilities which the evidence shows are used and useful in the service rendered to its consumers of gas in this state, the petitioner has been deprived of the right to earn a reasonable return upon the full fair value of its property used and useful in the operation of its intrastate business in this state in violation of the fundamental legal principle that a utility is entitled to earn a reasonable return upon the whole of its property devoted to public service." ■

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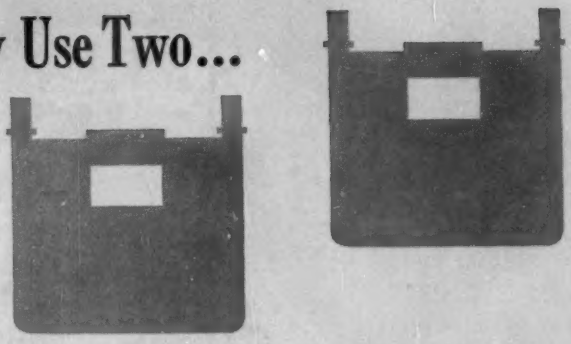

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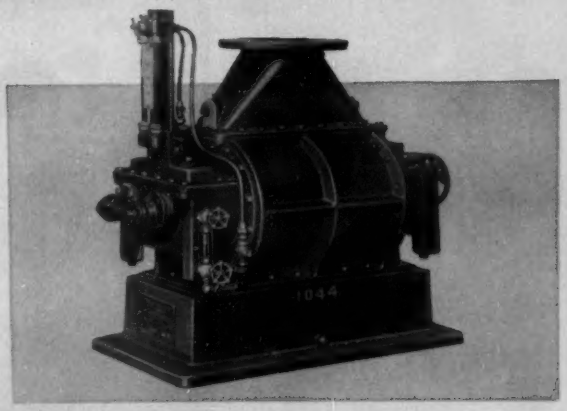

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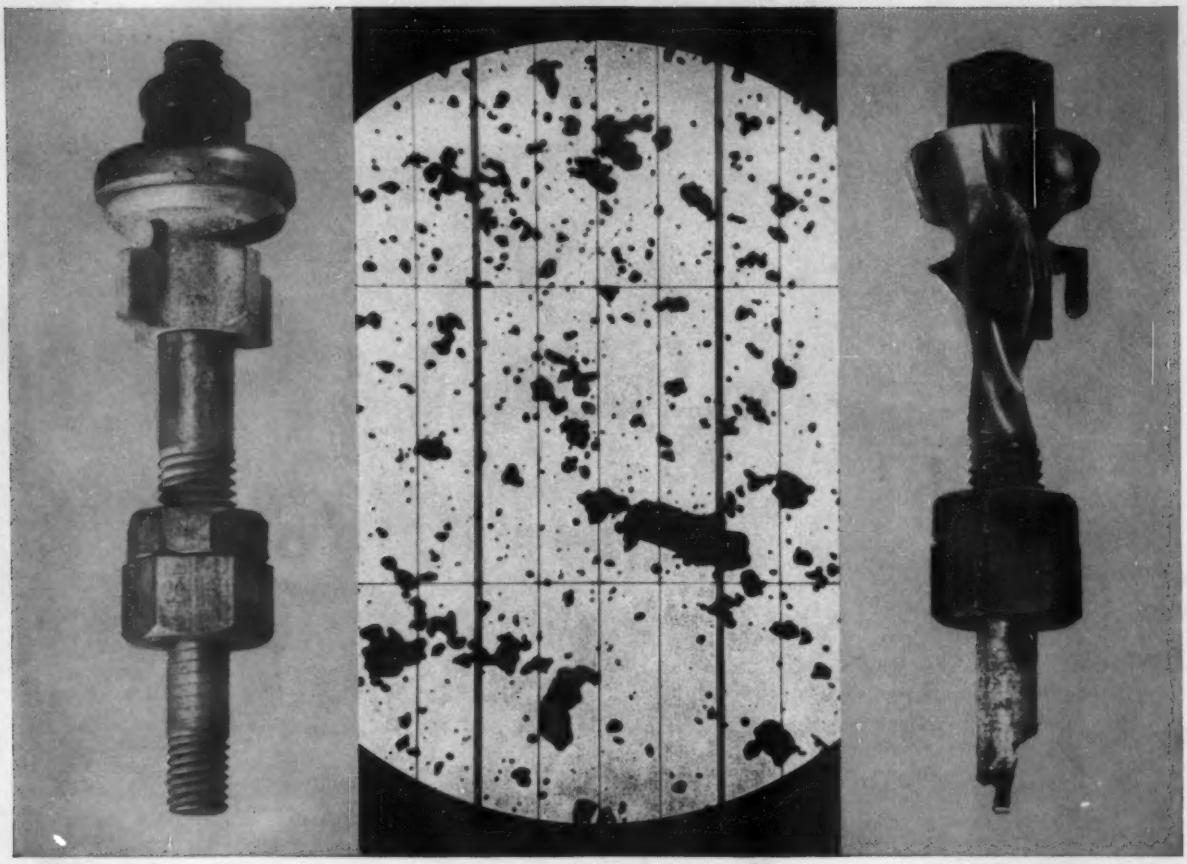

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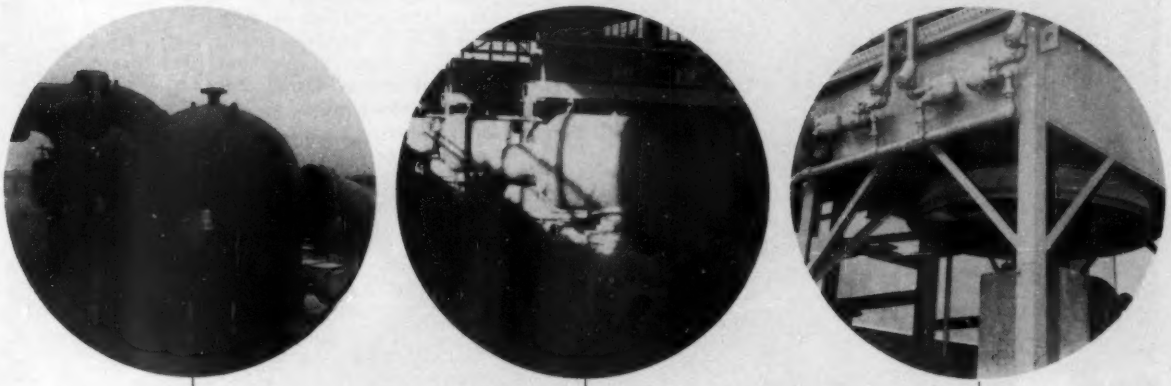
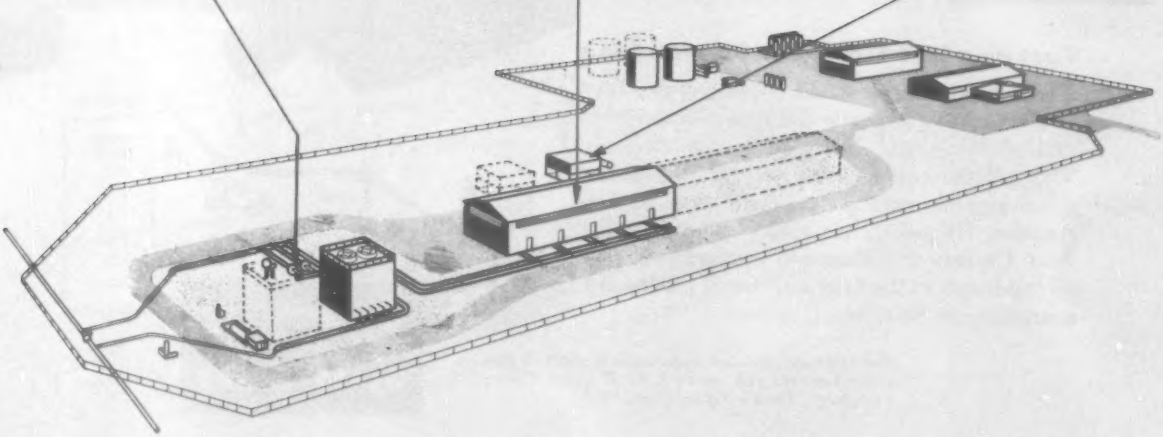


Desert station on-stream



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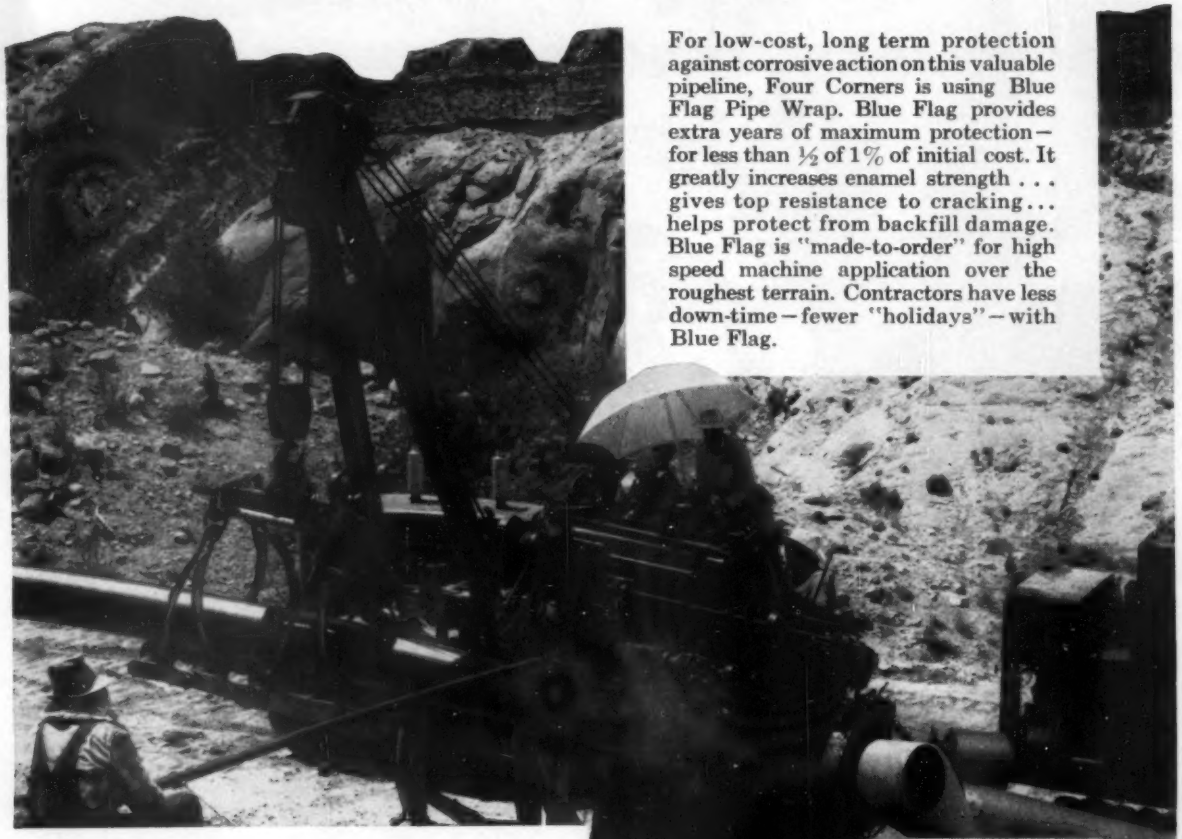

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New desert station boosts Cal-Counties 'import' supply

By JAMES JOSEPH

ON-STREAM now is Southern California and Southern Counties Gas companies' new, $3.5 million Needles (Calif.) compressor station lying athwart 285 miles of newly laid 30-in. pipeline — this, the third major natural gas artery from the Southwest which boosts the southern California area's total gas supply—75 per cent of it from out-of-state—above the 1-billion-cu-ft-per-day mark.

The compressor station, comprising 60 deep-desert acres some 11 miles south of Needles and 8 miles west of the Arizona-California border, begins operation with four 2000-hp Clark compressors, a design capacity of 227.6 MMcf/day and some 83 MMcf of usable line storage. A fifth compressor is scheduled to become operative by mid-year. By 1960, seven compressors—with a total 14,000 hp—will boost the plant's capacity to 328.8 MMcf/day, its usable line storage to 78.1 MMcf.

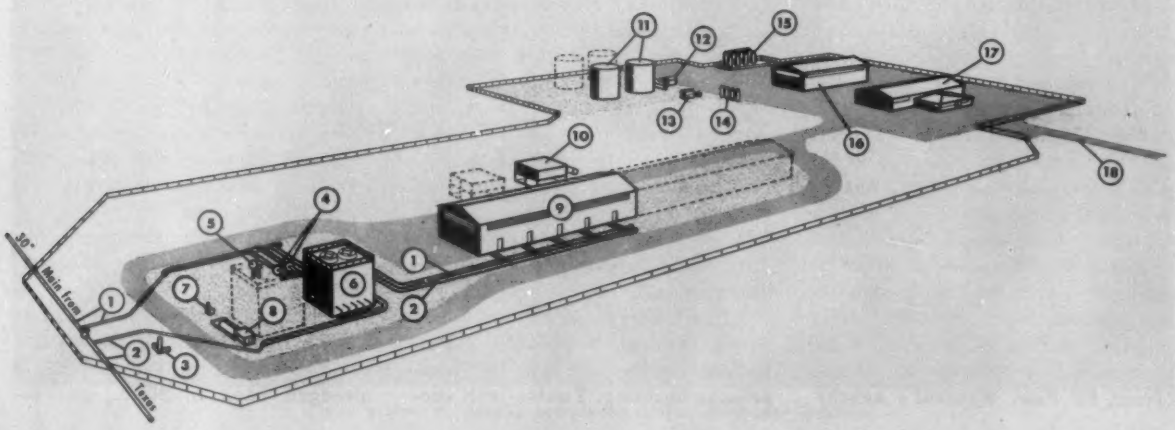
Except for a maximum 110 gpm of water, piped from Needles, a distance of 10.5 miles, the station is completely self-sufficient. Gas powers its engine-driven compressors, fuels two 577-hp Worthington electrical generators sets, the station's gas-engine driven fire pumps and powers one of two smaller air compressors — which furnish starting, instrument and utility air.

Some salient station features:

(1) Installed are two new-type Peerless spherical gas scrubbers, each weighing 11,500 lb and designed for 1000 psig;

(2) Protecting the station against flash floods is a prow-

Drawing of the Needles station. Dotted lines indicate future facilities. Numbered points are: 1. gas intake from pipeline; 2. station discharge; 3. station blowdown stack; 4. scrubbers; 5. scrubber oil fill tank; 6. main cooling tower; 7. acid storage tank; 8. chlorine storage tank; 9. main compressor building; 10. main engine jacket water coolers; 11. raw and treated water storage tanks; 12. raw, treated and fire water pumping facilities; 13. utility cooling tower; 14. compressed air storage tanks; 15. oil storage tanks; 16; electrical generator building; 17. warehouse, shop and office; 18. plant entrance road.



Air receivers are located outside generator building. Picture was made during construction.

shaped revetment, each leg some 1500 ft long, its outward slopes faced with concrete and reinforced asphalt;

(3) Vapor-phase cooling, on the gas-driven generator sets, is one of the first designed into a clean-gas-burning installation;

(4) An automated, central alarm board in the compressor building watchdogs the entire station, simultaneously monitoring a score of operations—and giving both audible and visual warning of trouble.

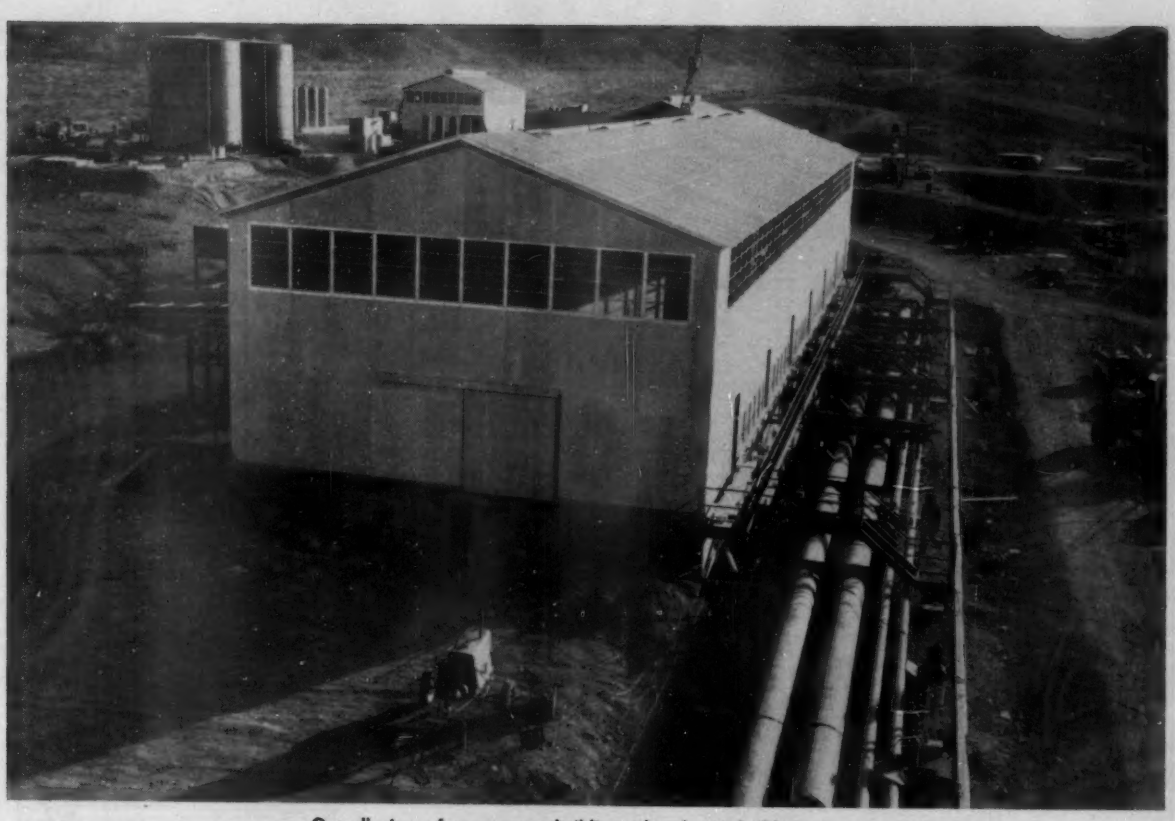
The Needles facility, at least initially, will act as a take-up plant, its load varying as Southern California and Southern Counties Gas companies' Blythe (Calif.) station—some 78 miles to the south—reaches its maximum 815 MMcf/day capacity. The Needles station is designed with an intake line pressure of 485-psi (from El Paso Natural's nearby Topock, Ariz., metering station). The new line, built both full size and high pressure (in anticipation of a maximum 7 compressors), can be packed to 936 psi—clear to Quigley station, near Los Angeles, some 241 pipeline miles to the west.

Incoming - from - Topock gas is routed from the mainline through two parallel 16-orifice meter runs, each monitored by one of the new rotary element, spherical Peerless Model S-72 oil bath gas scrubbers (their rotating steel mesh and wire elements driven by 115-v, fractional hp motors). Elements make one revolution every 6 minutes and are self-cleaning (as they dip into an oil sump supplied from a 4-ft diameter spherical charge tank).

After being scrubbed, gas flows through a 30-in. suction header which parallels the compressor building. Twelve-inch suction laterals off this mainline feed the intake pulsation dampners flanged atop each of the compressors' four cylinders. Compressed, gas exits through discharge pulsation dampners (in the compressor building's basement), via 10-in. discharge laterals to a 30-in. discharge header, thence to the two-cell Pritchard coilshed, induced draft cooling tower—where compressed gas, entering at about 180°F, drops 100°, exiting at 80°.

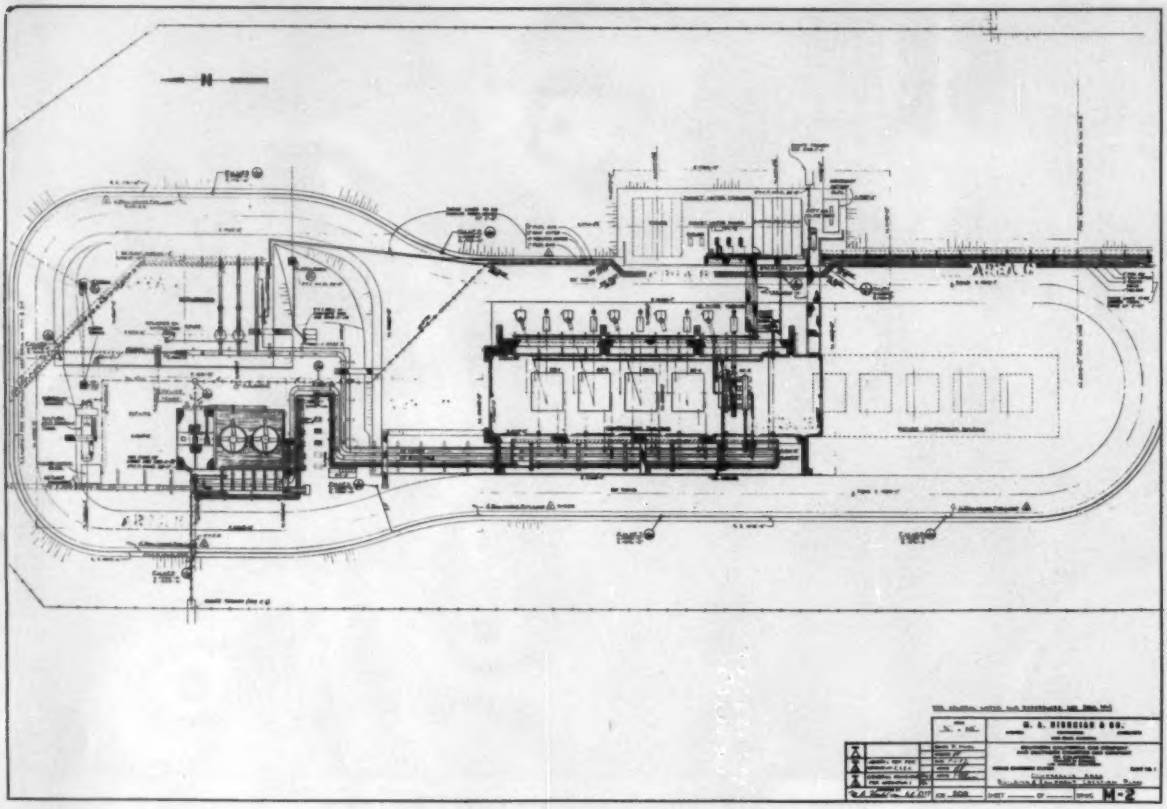
Each of the Pritchard's cells is installed with a top-mounted 14-ft diameter adjustable pitch fan, driven by a 30-hp motor. Six sections of the coils are devoted to gas cooling. One section is reserved for compressor lube oil water cooling.

Cooled, compressed gas exits the tower via 10-in. discharge laterals to a 24-in. line which is swedged back to 30-in., gas re-



Overall view of compressor building, also during building stage.

Interior view of Needles compressor station compresser building.



Schematic layout of compressor building, tower and scrubbers.

turning to the downstream side of the line through a 30x24x30 cylinder-operated Nordstrom block valve. A similar valve blocks the line to route incoming gas through the compressor station.

The station's 60-acre layout is, remarkably, one of the few choice sites in the area. Siting was complicated because of the terrain (which is subject to flash floods) and because there's surprisingly little solid footing in the area.

The station stands on a kind of mesa, its elevation some 1400 ft. Not only is the site relatively secure from flash floods, but its footing—red conglomerate—is so solid that pipeline trenches had to be blasted in the hard-packed formation.

Further, the site is terraced on three levels. Built on the uphill step—about 10 ft above the second— are the warehouse, shops, office (the only structure that's air conditioned), the auxiliary building (housing electrical generators and utility air compressors) and plant tankage (compressor lube oil, raw and treated water, dirty oil, etc.). The second step—10 ft lower—houses the compressor building, cooling tower and chlorination building. On a third step—6 ft lower—stands the incoming orifice meters, scrubbers and plant cooling tower.

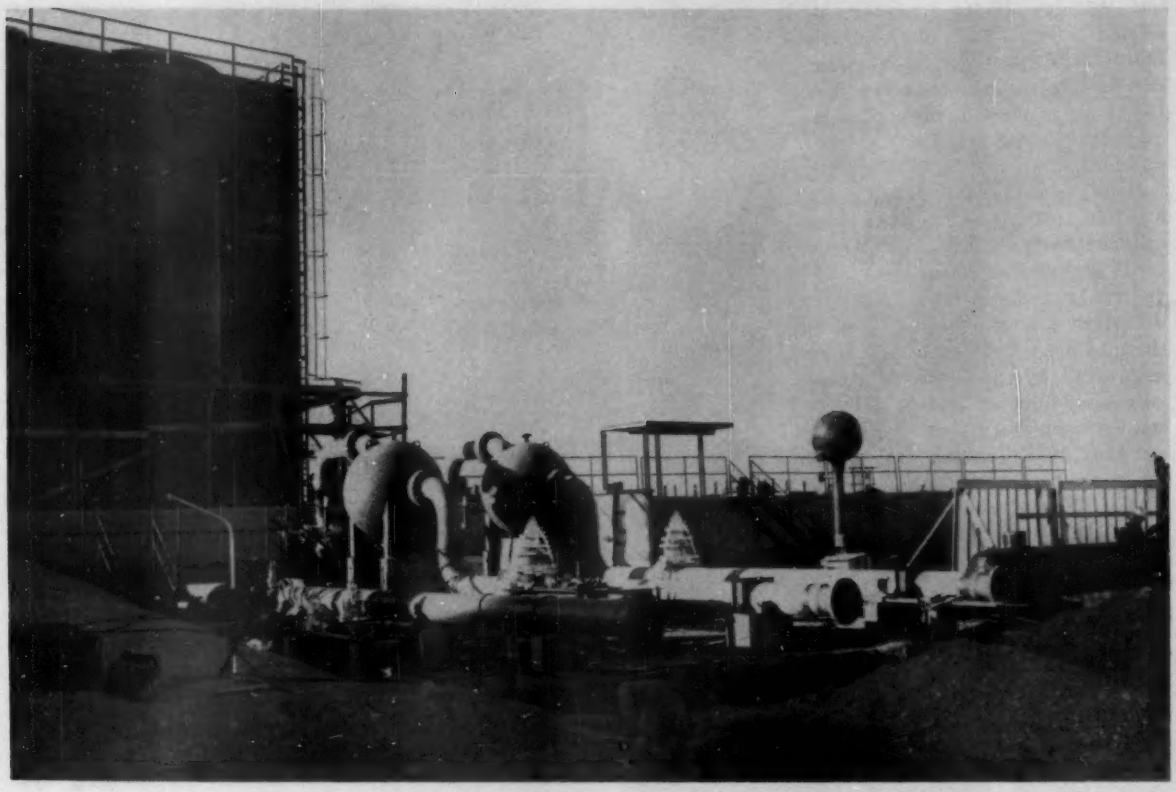
Guarding the site is a triangular, prow-like, 6-ft high revetment, its vortex at the uphill end of the station, each dike leg 1500 ft long.

The dike is massive, measuring some 8 ft across its top, 22 ft at the base, its sides steeply inclined (slope ratio: 1¾:1). One hundred fifty feet of facing concrete bulwarks the dike's vortex. Additionally, the dike's outward slopes are faced with 3 in. of blacktop, reinforced internally with No. 11 gauge black chain-line fence fabric, 10 ft wide. Rubble footings (some 4 ft wide, 2 ft high) run the length of the revetment, the footings constructed 2 ft below desert level.

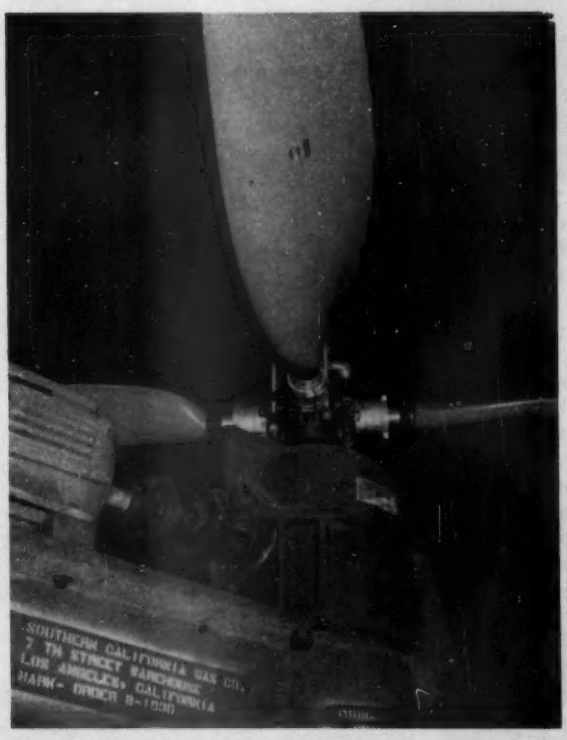
Plant fuel gas (some 1400 cu ft/hr per compressor) is tapped, immediately after scrubbing, by two standard orifice meters. One, a 4-in. orifice meter, fuels the Clark compressors. The other, a 2-in. orifice, supplies the Worthington generator sets.

Further, even should the plant be shutdown, the station's fire pumps and electrical generators would remain operative, fueled by two taps off the mainline (a ½-in. tap supplying gas-driven fire pumps, a 1-incher fueling the generators' drive engines).

A single jacket-water surge tank (outside the compressor building) serves the four engine-driven compressors. Currently, two pumps power the jacket water cooling circuit. These are 6x6x12 single stage end-suction units, delivering 1200 gpm of 150° water against a total head of 55 ft. They're driven by 25-hp motors. Jacket water leaving the engines at 175°F flows to the surge tank (4x25-ft and rated 100 psi), then is pumped to a two-fan Griscom-Russell horizontal fin-fan cooler,



Spherical scrubbers under construction. Cooling tower in background. At right, spherical vessel holds oil used by scrubbers.



Close-up of variable pitch prop in compressor jacket water fin fan cooling tower.

Vapor phase cooling tower and heat exchanger at the new Needles station.

one of its 12-ft diameter, 4-bladed Hartzell fans pitch-adjustable (and driven by a 30-hp motor through spiral bevel gears). The tower is designed to cool adequately (during full load) at 120° ambient temperature.

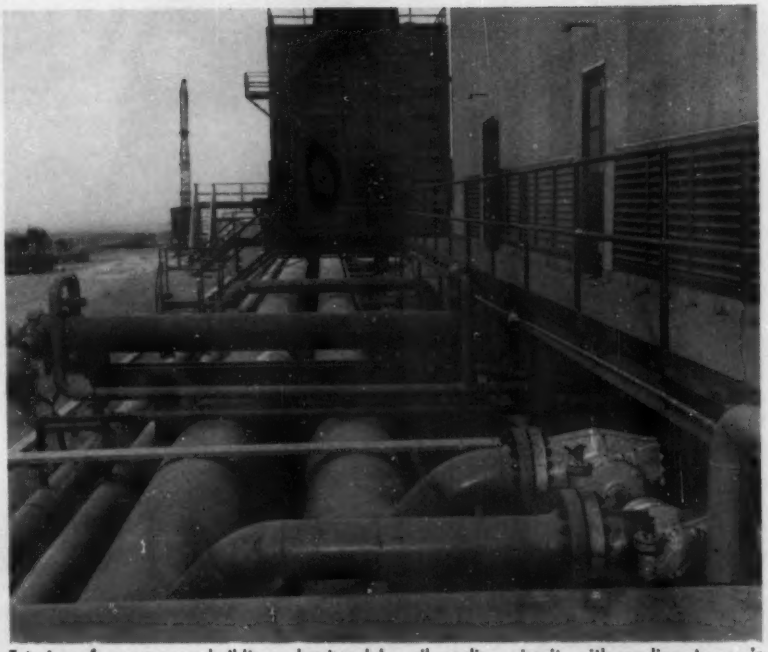
Compressor lube oil cooling—in a closed system—utilizes the same induced draft cooling tower which cools compressed line gas. Involved is a double-loop of 10-in. diameter piping running outside the compressor building, and monitored by three 4x5x10 single stage end-suction pumps delivering 610 gpm of 120° water against an 85-ft head (pumps are driven by 20-hp motors). Each compressor's oil cooler (Clark) is installed across this closed double line. Lube oil exiting the engines at 155-165°F, drops about 10° across heat exchangers. Prime reason for utilizing the greater capacity of the tower (when compared to the jacket water fin-fan cooler) is the large volume of coolant water available—and required—for lube-oil cooling. The shell side of exchangers carry the water; the tube side, lube oil. The same system furnishes water to the after-coolers of each compressor's turbocharger.

Compressor engines, installed with American Bosch pulse ignition generators and McCord lubricators, are equipped with 18-in. Maxim exhaust silencers, American oil-bath intake air filters and each mounts its own control panel.

Additionally, the compressor building's big, all-station monitor panel, incorporating an annunciator system, automatically warns of trouble in any of the plant's major systems and components. The warning, via an air horn, can —says area superintendent M. R. Tanner—"be heard for a mile."

Station water (some 100 gpm during the Mojave's sizzling summers) is pumped 10.5 miles through an 8-in. concrete-lined pipe (with an elevation head of 1000 ft). The source, two wells in the vicinity of Needles, Calif.

Electrical self - sufficiency is backboned by two SCCG-6, Worthington 4-cycle (577 hp at 514 rpm) turbocharged natural-gas fueled



Exterior of compressor building, showing lube oil cooling circuit, with cooling tower in background.

engines, with a bore of 10.75-in., a stroke of 14.5-in. They drive 500-kva generators and exciters (400 kw, 440-volt, 3-phase).

In the same generator building are two Ingersoll-Rand compressors which furnish plant starting and utility air. One engine-compressor combine is an Ingersoll-Rand 2-stage Model ES-2 air compressor delivering 169 cfm of free air at 250 psig, and driven by a 50-hp electric motor. The other—an Ingersoll-Rand Model R40B—is a two-stage, air-cooled compressor delivering 113 cfm at 250 psig, driven by a Wisconsin VG4D engine, which has been adopted to burn 1000 Btu per cu ft fuel gas.

Compressors supply: (1) instrument and utility air; (2) starting air; (3) emergency shutdown air.

Vapor phase cooling on the Worthingtons is perhaps vapor phasing's first use on engines burning essentially clean-gas (as opposed, for example, to fueling with sewer gas).

Explains Mr. Tanner, "We wanted to see how the system would work. Then, too, vapor phasing lets us use exhaust from the turbochargers to generate steam—which drives the condenser fan and provides steam for the direct-fired Servel all-year 5.4-ton office air conditioning system."

Vapor phase cooling is installed on the engine jacket water system of the Worthington engines. Installed are two Worthington ECSS 60 vapor phase separators and an ECTBG 1800 turbine-driven fan condenser, plus a dual pump condensate return (powered by a ⅓-hp motor).

With the Needles station on the line, southern California will draw 75 per cent of its natural gas from Mid-continent sources.

Says a gas company spokesman, "Annual increments have averaged 100 MMcf a day since gas was first brought into southern California 10 years ago. With the area's continued growth, we must assume that annual additional increments will be required at the same rate for a number of years in the future."

It is that ever-expanding future which Needles compressor station—eventually to house seven compressors—aims to insure.

Designed by M. A. Nishkian & Co. (Los Angeles), consulting engineers, the new compressor station was built by Peter Kiewit Sons Co. ■

The future possibilities of GAS CHROMATOGRAPHY

By WALTER J. PODBIELNIAK and SEATON T. PRESTON
Podbielniak Inc., Chicago

GAS chromatography has developed rapidly as a laboratory analytical method, as is evidenced by the ever-expanding literature on the subject. In any discussion of the future prospects of gas chromatography, however, it becomes necessary to consider it not only as a laboratory analytical method, but to also consider its future application as: (1) a field testing method, (2) as a process control method, and (3) as an industrial purification process.

As a laboratory analytical method, possessing the flexibility necessary to permit its adaptation to the analysis of almost any gaseous or liquid mixture, there can be little doubt remaining as to the important position this method is destined to assume in practically all analytical laboratories. Although relatively new, vapor phase chromatography has already been successfully applied to the analysis of practically all types of hydrocarbon mixtures (including gases, gasolines, and light oils) and organic liquids. In order to accomplish this wide range of applications, a variety of apparatus models have been developed to meet any specific analytical requirement. Gases and low boiling liquids, requiring operation at temperatures from 20 to 150°C, are easily analyzed qualitatively and quantitatively. High boiling liquids including methyl esters of fatty acids up to 20 carbon atoms in length, also can be analyzed chromatographically.

If one were to review the literature on vapor phase chromatography to ascertain the potential future of this method, one would find opinions varied, but generally very optimistic, even to the point of believing that this new method is capable of supplanting some of

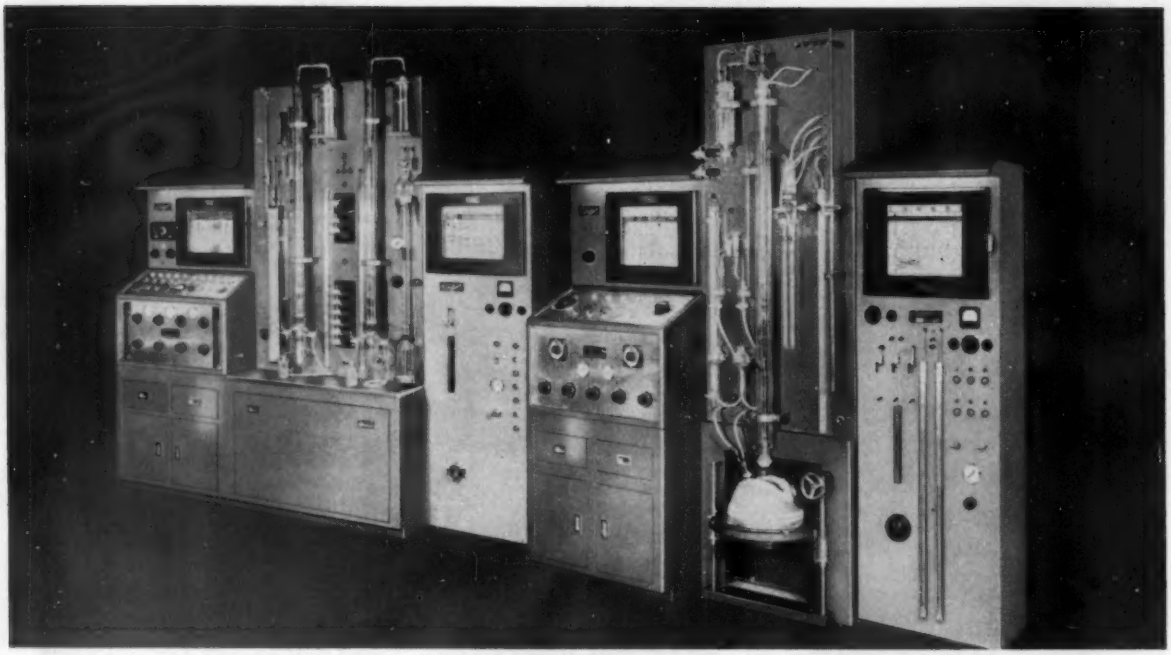


Fig. 1. Equipment combining chromatography with other analytical methods, such as low or high temperature distillation. Shown here are: Thermacon Series 8700, Hyper-Cal Series 3700, and Chromacon.

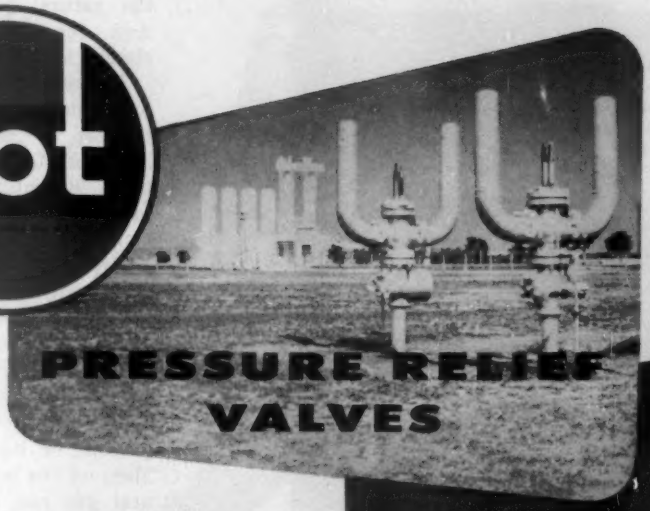
the existing analytical techniques. Later reports have generally tempered these early claims. It now appears that vapor phase chromatography will find its place beside the other analytical methods. To a certain extent it will supplement other methods, and even be dependent on other methods, in particular to unambiguously establish the identity of unknown components. Each analytical method has its own advantages and limitations that establish its application to any particular analytical problem, and will determine its frequency of use. Undoubtedly gas chromatography, with its speed and wide range of applications will be used for a number of analytical jobs previously accomplished by other analytical methods. The combination of gas chromatography with other analytical methods as low or high temperature distillation (*Fig. 1*), is an effective method of avoiding the limitations of both methods when used alone.

Although neglected in the literature, the application of vapor phase chromatography as a field or plant test offers a method which is capable of supplementing the data from, or replacing, many existing empirical test methods. The Janak method of gas analysis is a rapid method of analyzing any gaseous mixture, using a simple portable apparatus. The apparatus used for this method differs from other vapor phase chromatographic equipment only in the method of detecting components. The sample is eluted through a partition or adsorption column with pure carbon dioxide. The column effluent enters a nitrometer containing a strong caustic solution which reacts to eliminate the carrier gas. Consequently, only the components of the sample emerge consecutively to be measured in a calibrated glass burette. The Chromanette, shown in *Fig. 2*, is a recently developed apparatus for analysis by this method. It is portable, weighs 15 lb, and is completely self-contained including supply of carrier gas.

The applications of this apparatus, although limited by comparison with laboratory models, are numerous. It is capable of analyzing mixtures of light hydrocarbons from methane to butane accurately, including a determination of the pentanes-plus content, inert gases, olefins, and diolefins. It is applicable to the analysis of liquefied petroleum gases and, in general, may be used to determine any nonacidic component of a gaseous mixture. Its use has been reported in several English and French refineries, as a portable plant testing method. Dr. N. H. Ray reported on its use to determine impurities in ethylene, namely: hydrogen, methane, and ethane. He found that accurate determinations were possible even when the impurities were in concentrations less than 0.1 per cent.

The future of this method of analysis will include plant testing, in natural gasoline plants and refineries, and the testing of natural gases for propane, butane, and pentane-plus content. Although based on the use of small samples, 1 to 25 ml, the accuracy obtainable with equipment available today makes it appear that this method should be seriously considered as a potential royalty test method which avoids the weaknesses of present charcoal test procedures. Its ability to determine propane content of field gases accurately is sufficient to justify its investigation by the technical committees of the two natural gasoline associations. To expedite evaluation of the method, Podbielniak Institute donated a Chromanette to each of

got



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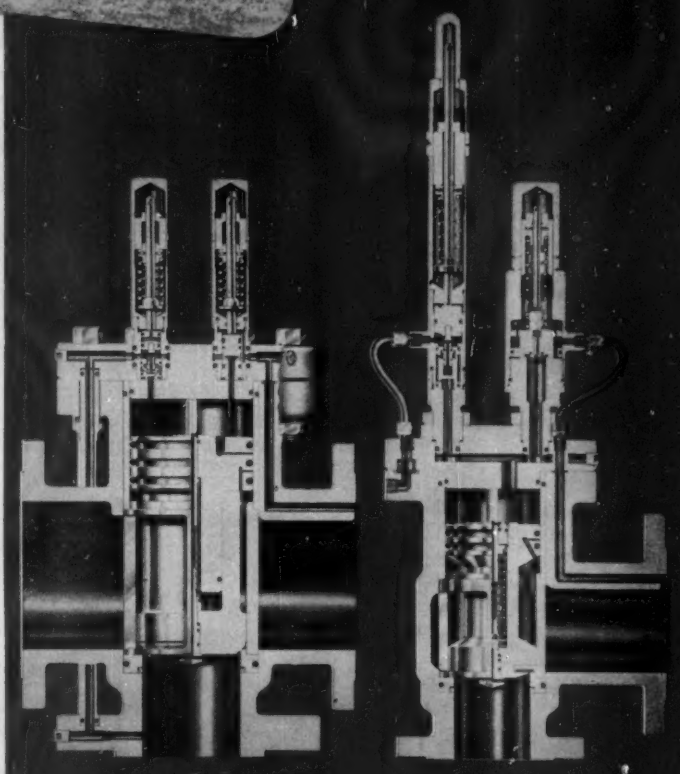

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Pressure range: 15 to 200 psi

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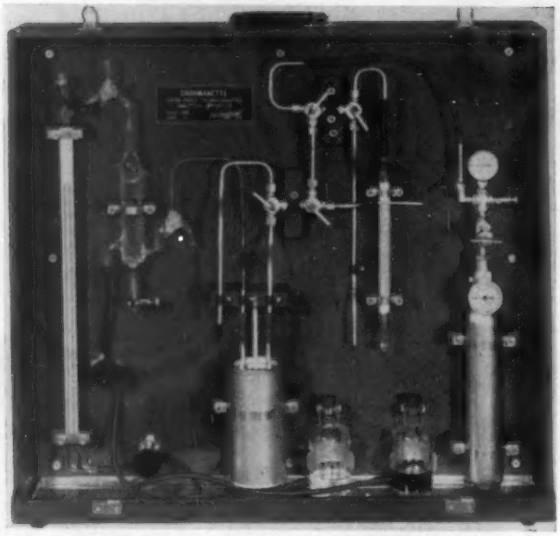

Fig. 2. The portable Chromanette, a pocket version of the Chromacon.

Fig. 3. The two models of the Chromacon are designed for continuous (cyclic) analysis of gaseous or liquid process streams.

the natural gasoline associations. And the Institute is working closely with these organizations.

The use of gas chromatography to continuously monitor the composition of process streams has been reported by several investigators. Recently two new models (*Fig. 3*) of equipment were announced for the continuous (cyclic) analysis of process streams. Although originally limited to gaseous streams, the difficulties inherent in the automatic introduction of minute liquid samples have been surmounted. These models are now applicable for the analysis of any gaseous or liquid process stream. Many of the larger petroleum, natural gas and chemical companies have been quick to utilize gas chromatography in this capacity. The speed with which results are obtained, and the high degree of reliability of the method, have stimulated several companies to supplement the automatic vapor phase chromatographic analyzer with an electronic computer and read-out system, capable of controlling the equipment producing the stream being analyzed.

Process control systems have been developed based on specific and non-specific methods of analysis. In general, a specific method is preferable but considerably more expensive. Non-specific methods include those based on various physical properties of the mixture, a change of which does not reveal the composition of the mixture, but does indicate the direction and amount of corrective control action required. Vapor phase chromatography offers an inexpensive specific method which may be used to control a process based on the composition of any key component.

Considerable progress is being made in this field of application. Much of this work is unpublished and will probably remain unpublished. In the future, we will probably see the use of automatic vapor phase chromatographic analyzers to continuously monitor various plant streams, as for example, absorber residue gases, LPG products, recycle streams, plant intake gas, and others in a natural gasoline plant. All can be analyzed cyclically with a single apparatus.

OIL AND GAS

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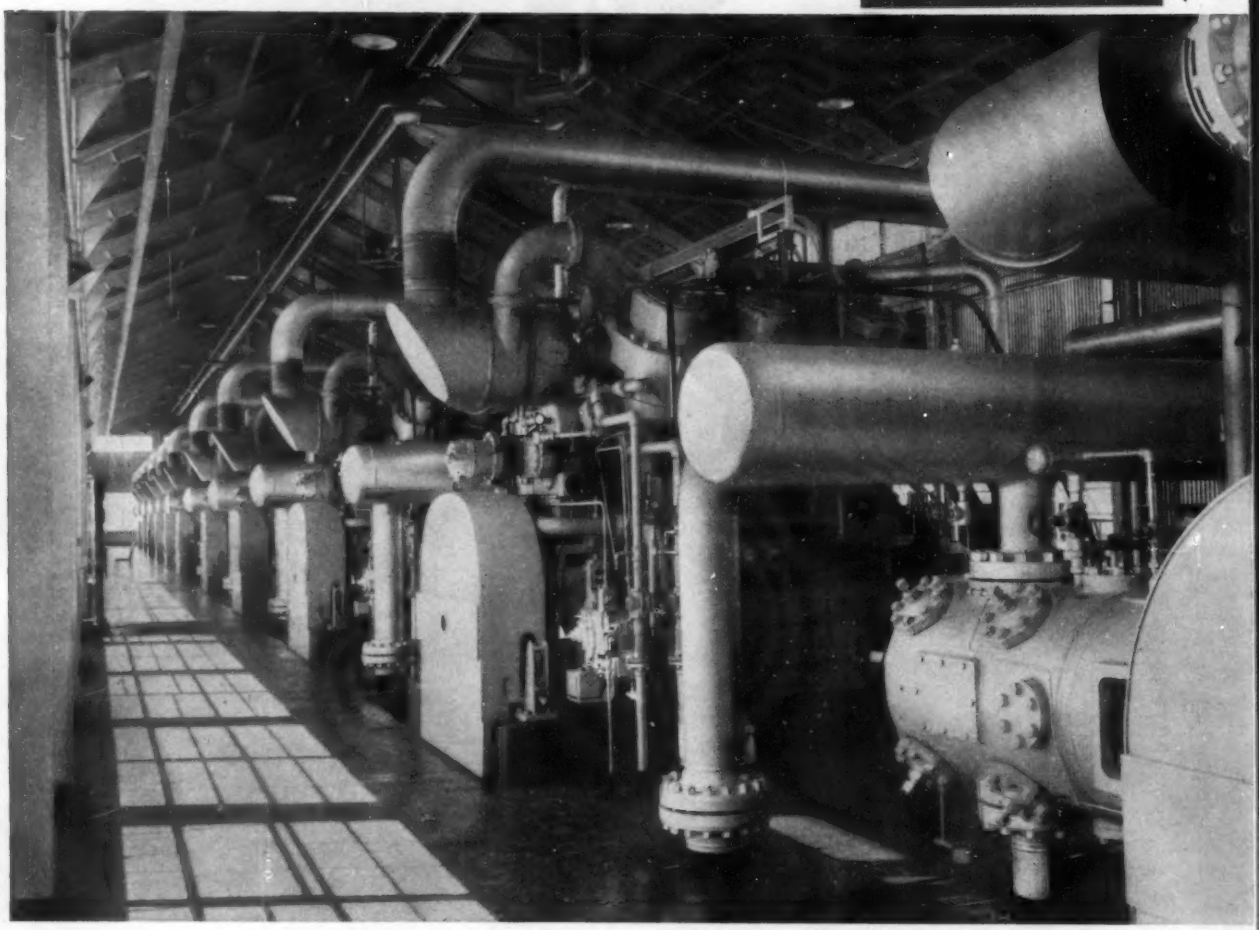
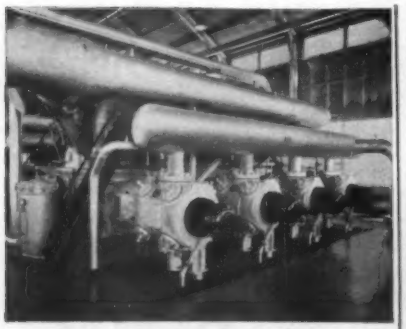
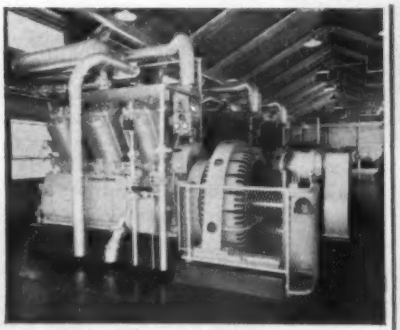
11 TURBOCHARGED KVS



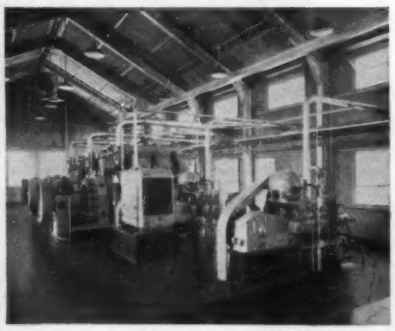
Eleven Ingersoll-Rand turbocharged 4-cycle KVS gas-engine compressors, totaling 20,000 hp, in main compressor building of Michigan Consolidated Gas Company, Six Lakes, Mich. The two sizes of compressors are identical in operation and have almost complete parts interchangeability.



Compressor side of 2000-hp KVS unit, showing the "compound" clearance pockets in the head ends of the compressor cylinders. These, together with pockets in the frame ends, permit 4-step loading of each cylinder.



Three 408-hp Ingersoll-Rand PSVG gas-engine-generator units provide all electric power for the Six Lakes station. These dependable 4-cycle, V-angle gas engines offer the same flexibility of speed and load as the large KVS compressor units.



Two Ingersoll-Rand two-stage ES compressors supply starting air for the KVS gas-engine compressors and the PSVG engine-generator units. Both have overhead-mounted electric drive; one also has standby gasoline-engine drive.

GAS-ENGINE COMPRESSORS

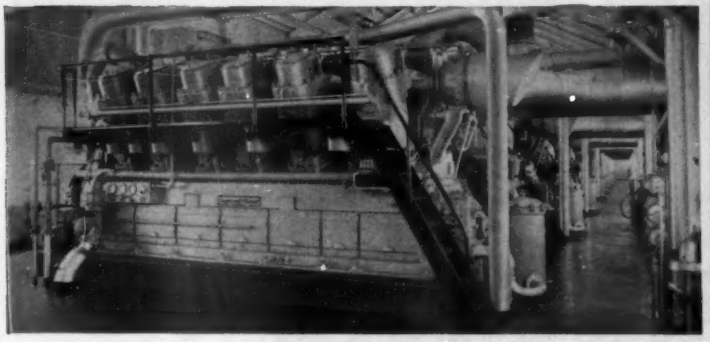
show ultimate flexibility

at Six Lakes Storage Field

Michigan Consolidated Gas Co. uses

from zero to 20,000 hp in many steps

with fluctuating pressures and capacities



One of nine 12-cylinder, 2000-hp turbocharged KVS compressors, from engine side.

One of two 6-cylinder, 1000-hp turbocharged KVS compressors, from engine side.

In the compressor station at Michigan Consolidated Gas Company's Six Lakes Storage Field, an all-Ingersoll-Rand installation provides the ultimate in loading flexibility. Two sizes of turbocharged 4-cycle KVS gas-engine compressors, with something new in capacity-control cylinders, allow almost infinite-step regulation from part of one cylinder to full-load on 40 cylinders.

The Six Lakes station takes from the pipeline whatever amount of gas is not currently needed by the Detroit area, and stores it underground for use when winter's demands exceed the pipeline capacity. By its nature, this type of service means that the compressors must be able to handle any load from a mere trickle to millions of cubic feet per day. Also, since the pressure of the storage field varies with the amount of gas in it, the compressors must be extremely versatile to handle many different pressures as well as fluctuating capacities.

At this station, different combinations of the nine 2000-hp and two 1000-hp Ingersoll-Rand KVS compressors may be used to provide 20 load steps in 1000-hp increments even with all cylinders loaded. The capacity of each cylinder of each machine can also be controlled in four steps by a unique method which I-R developed for this service.

In addition to this outstanding flexibility, there is easy speed control without sacrifice of gas and oil economy—another Ingersoll-Rand 4-cycle characteristic.

Also at the Six Lakes station, three 408-hp Ingersoll-Rand 4-cycle, V-angle PSVG gas-engine-generators supply all A-C power. Starting air for both the KVS compressors and the power units is supplied by two Ingersoll-Rand ES compressors—one with electric drive, and a standby unit equipped with gasoline-engine drive.

The exact compressor and power requirements for *any* pipeline application can be met with dependable, time-proven Ingersoll-Rand 4-cycle, V-angle engine equipment. Your I-R representative will be glad to give you complete information. Call or write now.

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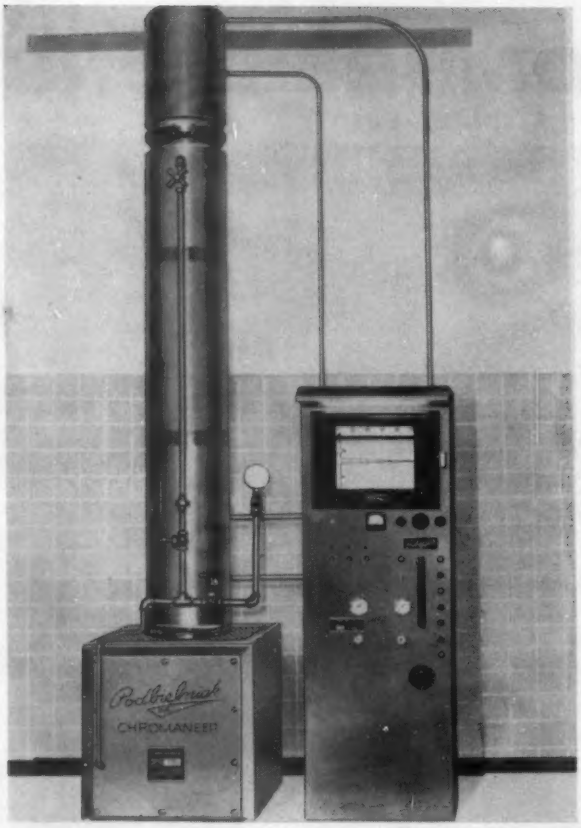


Fig. 4 (above). Vaporphase plant is used for industrial purification of liquid or gaseous materials produced in small quantities.

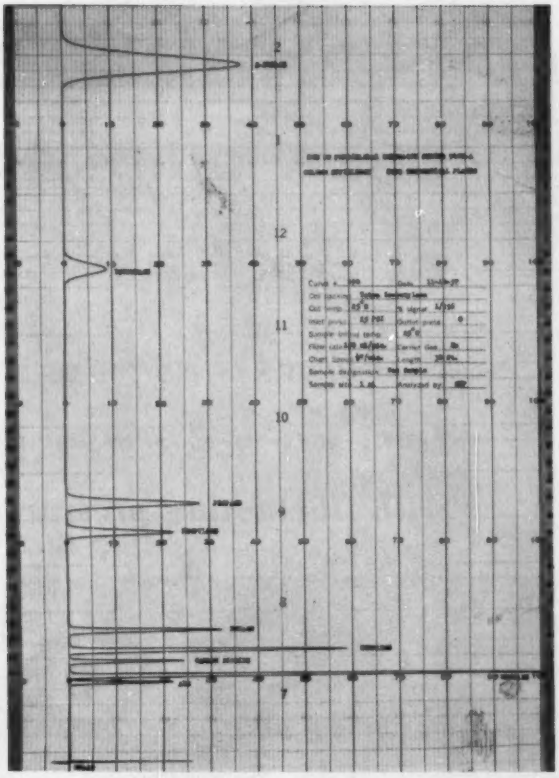


Fig. 5 (above). Current developments are directed toward increased detector sensitivity. Columns of 8000 to 12,000 theoretical plates produce chromatograms as shown here.

The operator of the future will find it far easier to adjust feedstock rate and other operating variables when faced with a continuous record of the composition of the various plant streams.

Almost immediately after the development of vapor phase chromatography some investigators reported on experiments in scaling up the size of the sample handled, by increasing the size of the chromatographic column. Initially, these experiments were designed to isolate fractions of sufficient size to permit the use of other methods of analysis requiring larger samples. With the disclosure that the efficiency of a column decreased but slightly as column diameter was increased, came the realization that the method was not limited to the use of columns of 1-in. diameter and less. By using 2-to 4-in. diameter columns, it is possible to process samples of 10 to 25 liquid cc's.

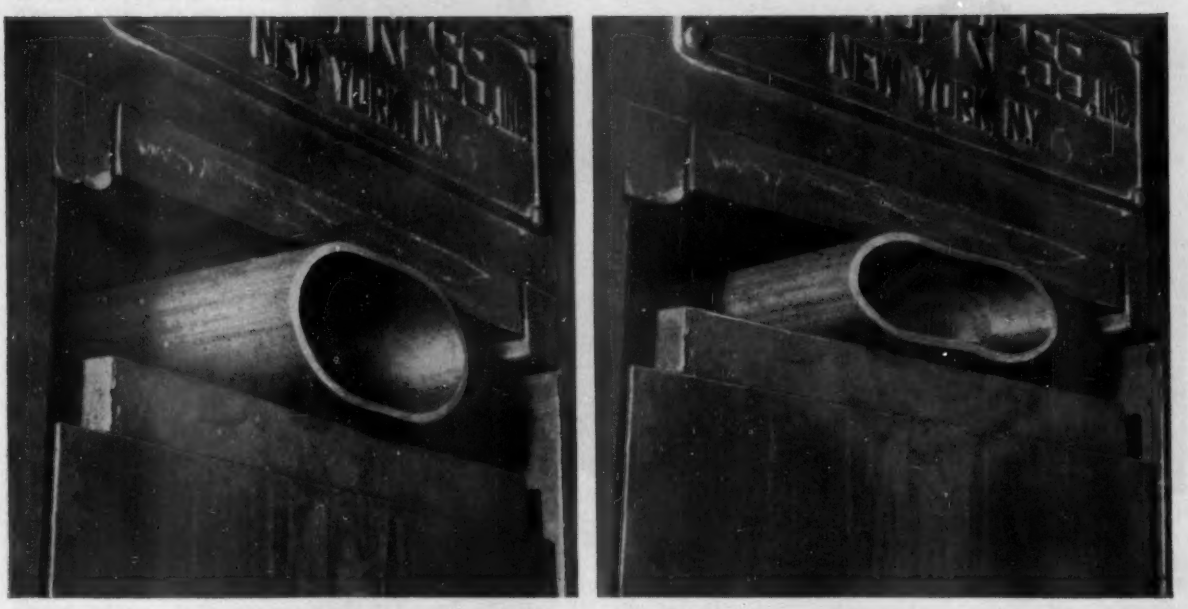
Since the time required to complete the elution of a sample is short, this process can be made cyclic and automatic. Then, it is applicable to the purification of a product required in relatively small quantities. Since the ability to separate an impurity is not limited by a small difference in boiling point, this method offers a unique procedure for small scale isolation of a component in a very pure state. A typical installation is shown in *Fig. 4*.

Current developments in gas chromatography are directed toward increased detector sensitivity and increased column efficiency. By using chromatographic columns of very high efficiency, better resolution of the components of complex mixtures may be achieved, thereby facilitating the identification of components and the calculation of quantitative results. Columns of 8000 to 12,000 theoretical plates produce chromatograms as shown in *Fig. 5*. These high plate efficiency columns permit the detection of lower concentrations (since peaks are sharper and better defined) and the analysis of wider boiling range mixtures, since the rate at which peaks broaden with increased retention time is lower.

The future will bring increased acceptance of gas chromatography as a laboratory analytical method, and as a process control method. Rapid development of vapor phase chromatography as a field test method is anticipated. Vapor phase chromatography used as a purification process will find a number of applications and will be able to compete favorably with other methods of separation, especially when high purity is required and the separation of impurities is difficult or impossible by conventional methods. ■

This article was adapted from a paper presented by the authors at the California Natural Gasoline Association meeting in Pasadena, Calif.

DUCTILITY



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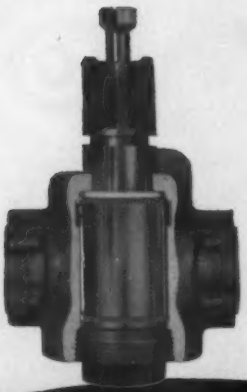

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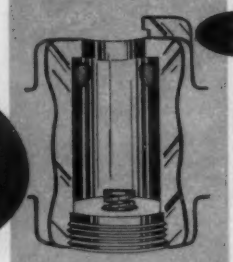
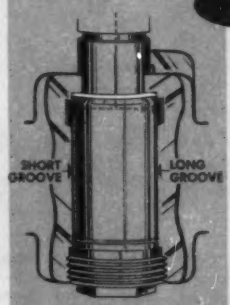
The lubricant stick (or bulk lubricant used with standard gun and accessory fitting) is forced into the valve through the plug stem. A ball check prevents the line pressure from escaping.



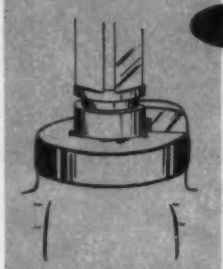
2

The lubricant is forced outward from the stem lubricant chamber into four equally-spaced lubricant pockets in the body which line up with the four lubricating grooves on the surfaces of the plug.



3

There are two short lubricating grooves on the plug and two long ones. The short grooves are the ones which pass over the ports when opening or closing the valves. These grooves are isolated from the lubricating system when the valve is being operated so there is no possibility of forcing the lubricant into the line. In full open or full closed position all four grooves receive a full charge of lubricant which spreads fully over the surface of the plug and body when the valve is operated.



4

When the valve is fully lubricated any excess lubricant is forced out of the body around the neck of the plug—it never enters the line. In this way there is positive visible indication that the valve has been fully lubricated and over-lubrication with the attendant contamination of the line fluid is impossible.

5

Self-lubricating Teflon head gasket seals tight. The lubricant grooves do not extend beneath the plug, leaving the bottom space free for line pressure to force the plug tighter against the head seat.

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James C. Saks
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Robert Johnson
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Harold Jones
Motorola

Homer Marrs
Motorola

M. W. Hartman
Darling Valve

WILLIS A. STRAUSS has been named administrative vice president of Northern Natural Gas Co., Omaha. Mr. Strauss was director of the company's certificate department. He will also become a member of the company's management board.

Several appointments have been announced by Motorola Inc., Chicago. HOMER L. MARRS has been appointed vice president and operations manager of the company's sales and service subsidiary, Motorola Communications & Electronics Inc. HAROLD A. JONES, former staff director of sales, succeeds Mr. Marrs as vice president and midwestern area sales manager. Motorola Communications and Industrial Electronics division has appointed RICHARD G. JONES as district manager, western area, operating out of Burlingame, Calif.

JAMES C. SAKS has been named sales manager of Trans-Canada Pipe Lines Ltd., Toronto. Mr. Saks joined Trans-Canada in 1954 as assistant to the president and assistant secretary. In the fall of 1955 he was named manager of gas supply in the Calgary office.

KELLY H. GIBSON is vice president for production of Pacific Petroleums Ltd., Calgary.

Several changes have been made by Transcontinental Gas Pipe Line Corp., Houston. N. W. LASSITER, JR. is transferred to Corpus Christi as superintendent of the newly created Compressor Division I. W. H. BUCKINGHAM becomes superintendent of Compressor Division II with offices at Baton Rouge. J. D. WHITE moves to Charlottesville, Va. as superintendent of Compressor Division IV. In the Houston headquarters of the compressor station department, W. W. ADAMS, JR., formerly superintendent at Sour Lake, Texas, becomes senior engineer. He is succeeded by JOE G. FLENIKEN. ROBERT V. LEFFERS is superintendent of Station 17 near Appomattox, Va. GORDON D. MYERS moves to Eunice, La. as superintendent of Station 5. J. O. BURDETTE becomes the new superintendent of Station 15 at Davidson, N. C. FRANK R. KEVERYN will be superintendent of the gas conditioning plant scheduled for Pleasanton, Texas. Superintendents of three new compressor stations are: OTTO H. LANE, Kings Mountain, N. C.; A. E. HAMALAINEN, Chatham, Va.; and R. L. MCINTYRE, Manassas, Va.

E. T. ROBINSON, JR. has been named general superintendent of Texas Eastern Transmission Corp.'s natural gas division. Mr. Robinson joined Texas Eastern in 1947 as an engineer. He has been assistant general superintendent since 1954.

W. ERNEST GRAHAM has been named administrative manager of the Little Big Inch division of Texas Eastern Transmission Corp., Shreveport. Mr. Graham had been vice president and director of the Philzona Petroleum Co., Phoenix.

J. R. WALKER and ERNEST L. ILSLEY have been elected vice presidents of Kaiser Steel Corp. Mr. Walker, formerly controller and assistant secretary, is now vice president and controller. Mr. Ilsley will continue as general manager of Kaiser's fabricating division plants at Napa and Fontana, Calif. BERNARD E. OLSEN has been appointed assistant export manager of Kaiser Steel.

Three new vice presidents have been elected by Black, Sivalls & Bryson Inc., Kansas City, Mo. FLOYD C. MYERS is vice president and manager of oil field sales. LAWTON L. LAURENCE is engineering vice president. And, WILLIAM F. GATES is purchasing vice president. BS&B also has named E. L. MCCARTHY manager of oil field engineering. He will headquarter in Oklahoma City.

D. P. MCDONALD is the newly named managing director of Westcoast Transmission Co. Ltd., Calgary. Mr. McDonald also is vice president and chief counsel. The company also has named VICTOR SPENCER to the board of directors.

M. W. HARTMAN has been named sales manager of the Darcova division of Darling Valve & Manufacturing Co., Williamsport, Pa. Mr. Hartman has been with the company since 1946 as district sales engineer in the Midwest.

ROBERT L. JOHNSON has joined Bristol Co., Waterbury, Conn., as sales engineer in the Toledo area.

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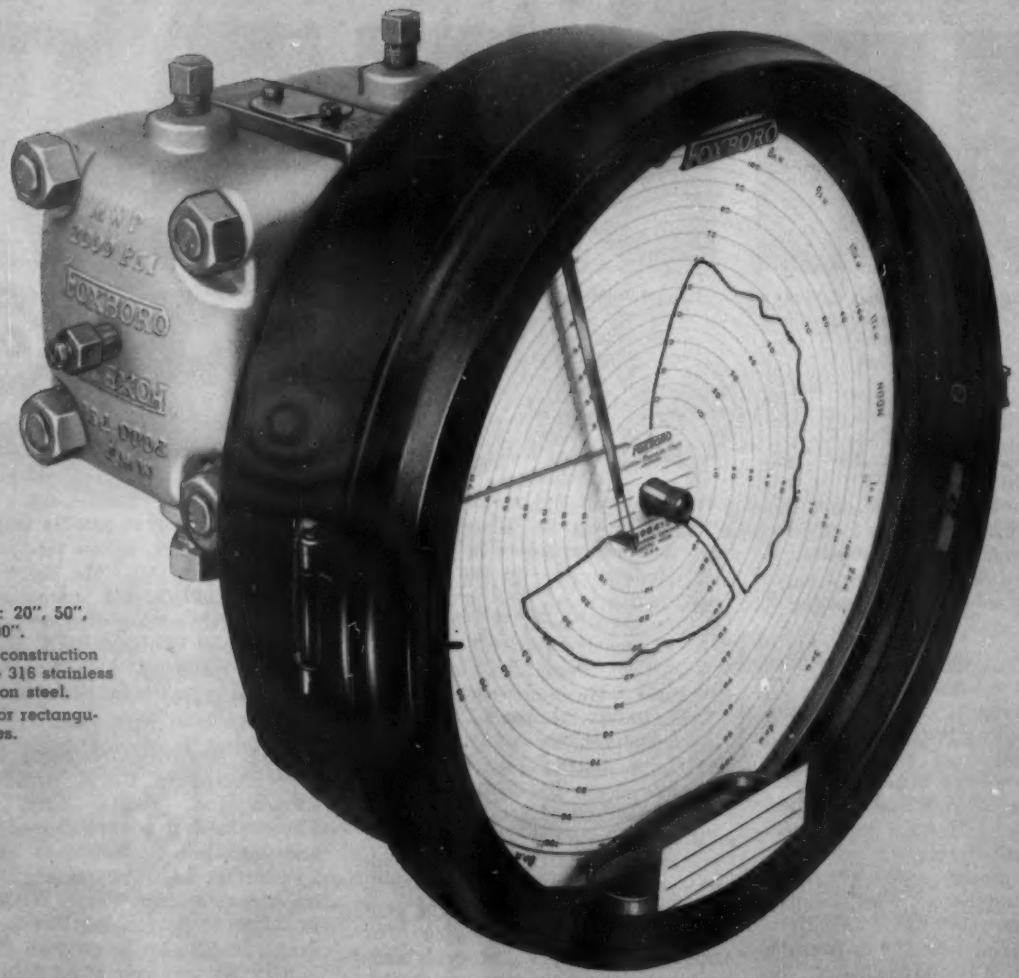

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- Forged construction in Type 316 stainless or carbon steel.
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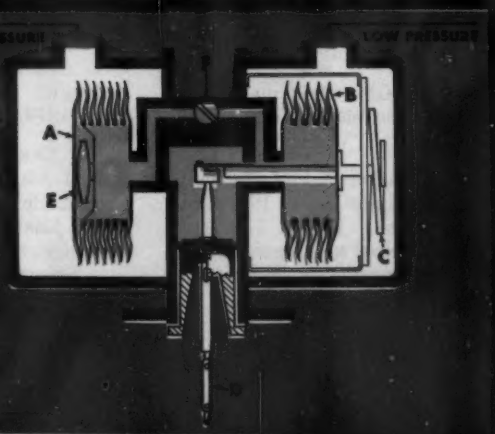
How It Works

In schematic drawing at right, areas shown in color represent a stable, non-freezing liquid. Any pressure increase in the high pressure chamber compresses Diaphragm Unit A, displacing its liquid and expanding Diaphragm Unit B until force of Range Spring C equals the difference between the forces on Diaphragm Units A and B. Linear motion of Diaphragm Unit B moves inner end of Drive Bar D — outer end moves correspondingly through the bellows-sealed flexure bar, driving pen arm. Built-in Temperature Compensator (E) proportionately adjusts diaphragm capacity as ambient temperature variations affect volume of filling fluid. External damping adjustment is shown at F.



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• *sustained high accuracy!*

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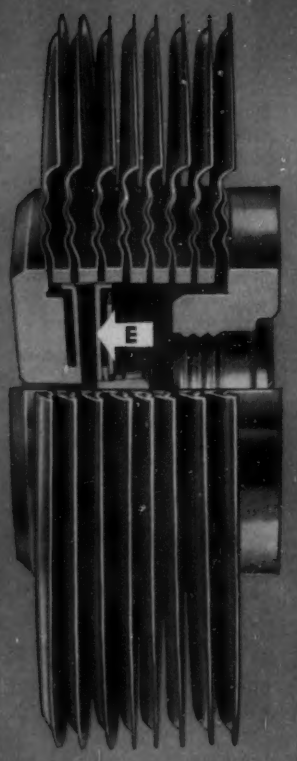
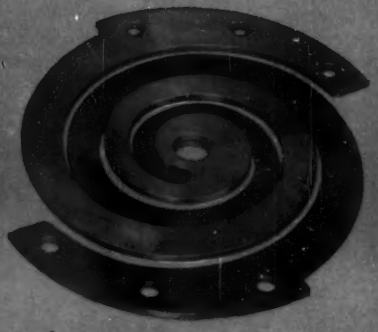


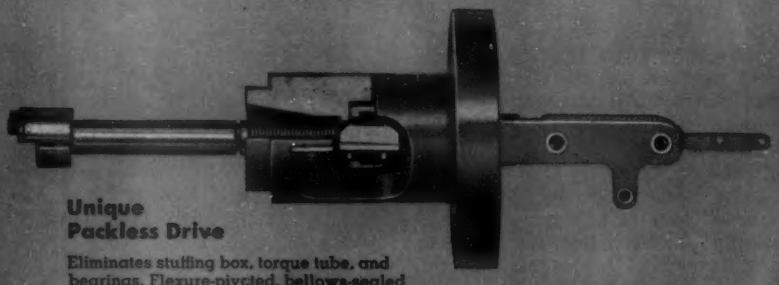
Exclusive Diaphragm Elements

Type 316 S.S. diaphragm units in both high and low pressure chambers provide greatest linearity and freedom from hysteresis; nesting design and integral spacer rings provide safe, positive, overrange protection. Temperature compensation (E) is built into diaphragm assembly . . . *never* requires change or adjustment.



Exclusive Range Springs

Heavy gauge Ni-Span C alloy, twin-spiral springs provide high sensitivity with lasting accuracy. Readily accessible . . . range changes are easily made, in minutes!



Unique Packless Drive

Eliminates stuffing box, torque tube, and bearings. Flexure-pivoted, bellows-sealed drive bar transmits diaphragm's linear motion to the pen arm with unequalled sensitivity and undiminished power. Seal for flexure pivot is a tough, flexible bellows.

EVERETT R. PHILLIPS has been appointed a field engineering supervisor in the Chicago district of the ElectroData division of Burroughs Corp., Pasadena.

United Gas Pipe Line Co., Shreveport, has named L. C. POINDEXTER chief engineer and C. W. HOLLENSHEAD superintendent of pipeline operations for the eastern division. Mr. Poindexter, who is a member of the board of directors, has served the company as draftsman, assistant construction engineer, district engineer, assistant general superintendent of field pipelines, and general pipeline superintendent for the eastern division. Mr. Hollenshead joined United Gas in 1935. Since 1948 he has served as assistant to the superintendent of pipeline operations for the eastern division.

THOMAS E. SMITH and WALTER J. BLAHA have joined the chemical plant engineering department of Pittsburgh (Pa.) Coke & Chemical Co. Mr. Smith joins the process improvement section as a chemical engineer while Mr. Blaha will be maintenance engineer of the maintenance engineering department.

Tennessee Gas Transmission Co., Houston, has created an overseas department to direct its exploration and production activities outside North America. STUART P. KING has joined Tennessee Gas as manager of the department. Four other key posts have been filled as follows: MARSHALL JEFFERS, manager of production; J. M. BROWNING, manager of exploration; EDWIN ROSS, assistant manager of production; DR. H. J. HARRINGTON, senior geologist.

W. B. NEIDERT has been appointed superintendent of operations of the Texas Gas Corp. plant at Winnie, Texas.

ROBERT D. SUTHERLAND has been appointed manager of the newly opened Los Angeles branch office and warehouse of C. Lee Cook Co., Louisville, Ky. MORGAN WASHBURN, who has been Cook's California representative since 1928, is retiring.

ROBERT E. PALMER, partner in the New York firm of Reynolds & Co., Inc., has been elected to the board of directors of Williams Brothers Co., Tulsa.

GAS • Pipeline News

Industry feeling impact of court's Memphis decision

All segments of the gas industry are feeling the effects of the Memphis decision, which is bound to become as well known as the famous Phillips decision.

The $182 million Beatrice project to increase supplies in the Rocky Mountain and Midwest market areas has been postponed (but not permanently); distributors have asked the FPC to reject rate increases filed by pipeline companies; pipeline companies are reportedly asking the commission to reject field-price increases.

In November the U. S. Circuit Court of Appeals for the District of Columbia ruled that procedures followed by the FPC in rate proceedings since enactment of the Natural Gas Act in 1938 were unfounded in law. In some quarters it is feared that the decision casts doubts on the legality of hundreds of millions of dollars now being collected by pipelines as a result of rate cases long since concluded. Utilities and municipalities already are filing statements with the FPC either for rebates on rates already in effect or for nullification of rates now under consideration.

Among cases already hit are those of United Gas Pipe Line Co., objected to by Mississippi Valley Gas Co.; Pacific Northwest Gas Corp., hit by the Washington Public Service Commission and Mountain Fuel Supply Co.; Northern Natural Gas Co., blocked by a group of about 9 distributor-customers; Colorado Interstate Gas Co., whose rate increase application was already under fire by the state Public Utilities Commission; El Paso Natural Gas Co., whose rate increase is objected to by Southern California and Southern Counties Gas companies, under orders of the California commission. It is believed by some that El Paso itself was considering the Memphis decision when it asked the FPC to block a proposed field price increase by Sun Oil Co. and Phillips Petroleum Co.

The FPC, which is "quite optimistic" that it will get a writ of certiorari, throwing the case to the Supreme Court, feels that the decision will be adverse to consumers. The financial stability of many pipelines may be impaired or destroyed, thus hampering or perhaps terminating existing service and preventing continued and necessary expansion of the industry.

Also disturbed by the decision are Wall Streeters. "The chances for financing by the pipeline companies pending the Supreme Court's action are pretty slim," said a utility analyst for one of the leading banks. "We'd take a very, very careful look at any plans they advanced and would have, I admit, a jaundiced eye."

A little less pessimistic is a utility specialist for a major insurance company that has been active in financing pipelines. "I wouldn't advise anyone to sell his pipeline common stocks . . . yet," he said. He added that he was "optimistic in the long run" that either the Supreme Court or Congress would upset the circuit court ruling.

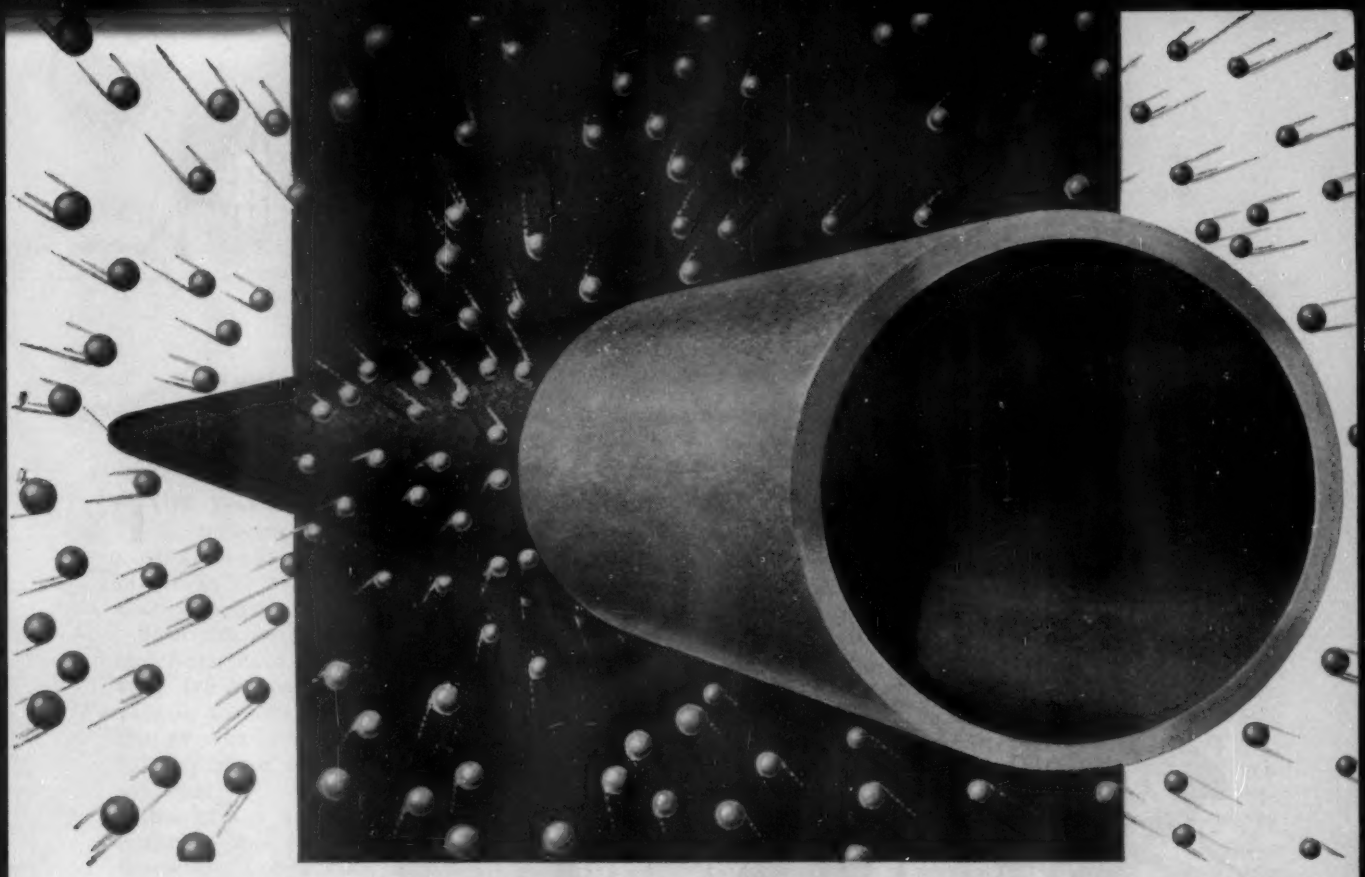
"Not in the best interests of any segment of the gas industry," is the way Brooklyn Union's John Heyke sees the decision.

When Brooklyn Union switched to natural gas, Mr. Heyke said, the company was aware that it would be required to pay whatever rate the commission found to be just and reasonable. "Furthermore," he continued, "we understood that during the period while the FPC was making this determination, a higher rate might be paid but such payments were subject to refund."

If the Memphis decision is not reversed, Mr. Heyke expects that "it may well make it more difficult for us to acquire additional gas supplies and make these supplies more expensive."

The Value Line Investment Survey, published by Arnold Bernhard & Co., believes that a reversal of the decision seems "far more likely to be forthcoming than enactment of the Harris Bill." Such a reversal might occur anywhere from six months to two years from now, it says.

(*Continued on page* 137)



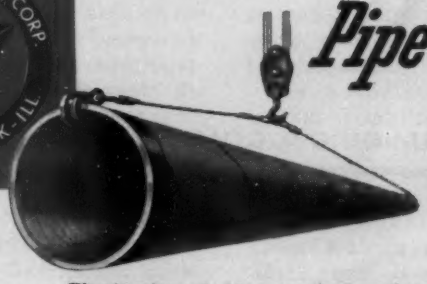
Steel Shot Cleaning makes Pipe Protection Stay Put

Applying protective coatings to improperly prepared pipe surface makes about as much sense as building a skyscraper on sand. Pipe Line Service has always pioneered in developing new ways to insure a good bond . . . a bond that makes protective coatings practically inseparable from the pipe itself.

An outstanding example is steel shot cleaning. Special machines permit bombardment of the pipe surface with millions of steel pellets traveling at high speed. Result? Not simply removal of mill scale and rust . . . but actually an "etching" of the steel surface. This slightly roughened surface allows the protective coating to "take root"—gives you the years of protection that you should have.

We emphasize Pipe Line's steel shot cleaning process because it was one of the great steps forward in maximum protection of *your* pipe investment. It's a manufacturing extra that's provided at no extra cost . . . and one more reason for extra confidence in specifying protection by PLS!

PIPE LINE SERVICE CORP. SERVICE EQUIPMENT MATERIALS FRANKLIN PARK, ILL.



Pipe Line Service Corporation

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Quality pioneers in coating and wrapping pipe for over a quarter century

Plants also at: Monmouth Junction, N. J.; Glenwillard, Pa.; Sparrows Point, Md.; Longview, Tex.; Corpus Christi, Tex.; Provo, Utah; Harvey, La.

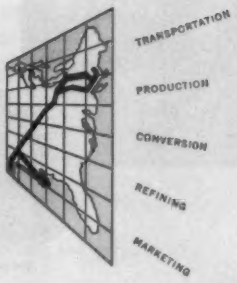
Sales offices at all plant locations . . . and Atlanta, Ga.; Houston, Tex.; Lincoln, Nebr.; Tulsa, Okla.

FROM THE GROUND UP...

From gas well to distant city... from wildcat test to service station driveway... Tennessee Gas Transmission Company is active in every aspect of oil and gas.

Our name tells you we transport natural gas... about two billion cubic feet daily, in fact, through 10,000 miles of pipeline in 15 states. Today we also explore for and produce oil and gas from South America to Canada... extract and convert natural gas hydrocarbons ... refine, transport, and market a full range of petroleum products.

Like the industry itself, we are broadening our activities... for ever-wider service to America.



TENNESSEE GAS TRANSMISSION COMPANY

AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

HOUSTON, TEXAS

Communications and Automation

By FRANK CHAPMAN

FCC faces year of studying allocations

THE Federal Communications Commission study of the long-range future of allocation of space in the 25 to 890 megacycle frequency spectrum is underway.

Some 200 persons, firms and associations have filed statements with the commission proposing various methods of re-organizing the government's policies of allocating space in this frequency spectrum.

One of the most far-reaching proposals was submitted by the Electronic Industries Association's land mobile communications section. It proposed that the entire frequency range between 15 kilocycles and 30,000 megacycles be rearranged on a "functional" basis with a new order of priority among industries.

Communication uses would be grouped into eight categories under the plan: National defense; public safety; travel safety; commercial; education and entertainment; research and development; public correspondence, and personal convenience. Thus, space would be assigned by use, rather than by the nature of the user. The government, for instance, would have space in several categories, depending on the agency and the function of the equipment.

Under the EIA plan, the FCC would first decide how much space should be allocated to each of the eight basic functional categories. At present, education and entertainment has 59.5 per cent; the federal government 25.7 per cent; research and development 5.2 per cent; travel safety, including aeronautical uses, 4.4 per cent; commercial 2.3 per cent; public safety 1.7 per cent; personal convenience 0.7 per cent, and public correspondence 0.5 per cent.

In setting the functional allocations, the FCC would have to consider the technical aspects of various ranges in the spectrum in connection with each use, the association said. In addition, the economic demands of various frequencies would have to be related to the user groups, EIA pointed out.

The association also emphasized that "additional frequency allocations for land mobile use are necessary and should be made contiguous to the three bands now being used" by these services.

The American Petroleum Institute, speaking through its committee on radio facilities, said that during the next 10 years, existing users expect to increase the size of their systems by 50 to 70 per cent, making a total of from 64,000 to 80,000 units in 10 years.

The API backed selective geographical sharing in the 25 to 890 mc bands, but did not favor the complete abandonment of the present block allocation system, and said that time sharing is not practical. Scatter techniques, it added, will have only limited application to the natural gas and petroleum industries, but passive reflector applications may be useful.

Broadband coordinated mobile communications systems, although somewhat wasteful of spectrum space, are useful for base-to-mobile dispatching, the API said.

The association also urged against permitting either the general or specialized communications common carriers to enter the field of mobile and fixed intra-organizational communications. These systems of the type for which channels are now provided do not give common carrier-type service, it said.

The American Telephone & Telegraph Co., in its comments on the allocation study, again stressed what it termed the need for broadband frequencies for common carrier mobile radio service. The need "is more urgent now than ever," the company said, and contended that "a bold new approach is required on the part of all concerned if mobile service is ever to develop into the low-cost, adequate service for the great mass of the people that it surely can become."

As of last June 30, the statement said, Bell System companies were furnishing service to about 17,000 motor vehicles through 485 base station channels at 293 locations. But present allocation policies, it added, are restricting further growth because no more than 14 channels can be used at any one location, and not more than 1000 to 1200 mobile telephones can possibly be served in any major city.

AT&T asked that a common carrier mobile telephone allocation in the 60 to 500 mc band be assigned to handle 200 two-way channels to develop its broadband multichannel system. Bell argued that a broadband common carrier mobile system can "provide almost any desired increase in mobile service, with very efficient use of the frequency spectrum."

This study, like a companion study of allocation in the microwave frequencies above 890 mc, will be slow to bear fruit. The microwave study isn't expected to be completed for some months, and the full results probably won't be known until near the end of the year, FCC spokesmen say. ■

From the day we produce them . . .

. . . till the day you apply them . . .

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ON line after line, in all types of terrain and soil, tough, durable *Pitt Chem* Coal Tar Enamels have *proved* their superior ability to provide sure, economical pipeline protection—year after year. But there's *another* big reason why so many companies specify *Pitt Chem* Pipeline Enamels. And that's Pittsburgh's Four-Way service program:

1. Complete Quality Control As a basic producer, Pittsburgh maintains rigid quality control standards at every step of enamel production, from coal to finished coating.

2. Written Specifications Published to guarantee you consistently superior quality and performance from every drum of *Pitt Chem* Pipeline Enamels —in application and in service.

3. Experienced Sales Service *Pitt Chem* sales representatives are experienced coating men. They talk your language, will help you plan the many requirements of your coating job.

4. Technical Service Pittsburgh maintains a full time staff of field service men to work with your field men in the efficient, economical application of coattings. *Write us about your protection requirements!*

★ PITT CHEM Pipeline Enamels
★ PITT CHEM Coal Tar Coatings
★ PITT CHEM Insul-Mastic Coatings

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COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

pipeline news • *Cont'd.*

(*Continued from page* 132)

Oklahoma-to-Missouri line planned by new company

On file with the FPC is an application from Missouri Transmission Co. to build and operate a 256-mile line from the Missouri-Oklahoma border to the St. Louis area. (See January GAS, Highlights). The 16-in. line would cost an estimated $21.9 million. Eugene Williams of Springfield, Mo. is president of the transmission company.

According to the application (Docket G-13779), the line would connect at the Oklahoma-Missouri border with the Mookl Chemical & Gas Co. pipeline, which has applied for a certificate for a line from Pottawatomie county, Okla. to the Oklahoma-Missouri border.

Missouri Transmission says it plans to supply a plant in the St. Louis area, now operating under a contract with the AEC, and any customers along the route of its line desiring service. The line will terminate at the southern border of St. Louis county, Mo., near the town of Pacific.

Lone Star-to-NGPL deliveries begin

Lone Star Gas Co., Dallas, is delivering gas to the transmission system of Natural Gas Pipeline Co. of America under terms of a 20-year contract.

Lone Star spent $1.2 million for new facilities to help make the deliveries possible. The contract calls for Lone Star to deliver an average of 35 MMcf/day to Natural through 1958, an average of 50 MMcf/day in 1959, and an average of 80 MMcf daily for the remaining life of the contract.

Lone Star President L. T. Potter said total gross revenues from the sale to NGPL in 1958 are expected to approximate $2 million. This will increase as gas deliveries are stepped up in accordance with the contract. Deliveries for the first year will amount to almost 13 billion cu ft, he said.

Natural's transmission line taking the Lone Star gas in Oklahoma originates in the Wise county area of north Texas. Gas supplied by Lone Star comes from reserves in Stephens, Garvin and Carter counties, Okla., through an eight-year-old 70-mile line extending southwest from Garvin to Petrolia in Clay county, Texas.

New facilities built by Lone Star include seven dehydration plants, a satellite absorber unit, additional compressor units, pipelines to deliver additional gas to the 20-in. line feeding Natural's system, as well as pipelines to serve the absorber. All of these facilities are scattered throughout Stephens, Carter and Garvin counties.

Cooper-Bessemer forms electronic control div.

A new electronics-controls division has been formed by Cooper-Bessemer Corp., Mt. Vernon, Ohio.

Credit for creation of the department, according to Ralph L. Boyer, vice president and director of engineering, is due to the anticipated trend to automation of power and compressing operations by pipeline, petrochemical and industrial plants. Within the next 10 years, for example, it is expected that the major gas transmission pipelines in the U. S. will be automated (see GAS for January).

One of the first to explore the technology of automatic controls, Cooper-Bessemer has been engineering satellite semi-automatic and fully automatic systems for the past several years. By the use of the automated systems, it has now become practical to start up engine-driven or electric motor-driven compressors, load the compressors onto the pipeline, regulate compressor capacity within precise limits, cut the compressor out of the pipeline, and ultimately shut down the entire unit.

Some of the newest automated systems utilizing Cooper-Bessemer compressors provide for remote control regulation of an entire compressor station — without attendants of any kind—by microwave signals from distant control centers.

One principal advantage of automatic control is the simple ability to operate both engine and compressor equipment at peak efficiency. Since response of automatic controls to changing load condition is almost instantaneous, maximum economy in fuel and operating costs is most easily attained.

Heading Cooper-Bessemer's new electronics controls division is Reed D. Hamilton.

Am-La's contract demand rate denied second time

For the second time, American Louisiana Pipe Line Co. has been denied the demand - commodity form of rate.

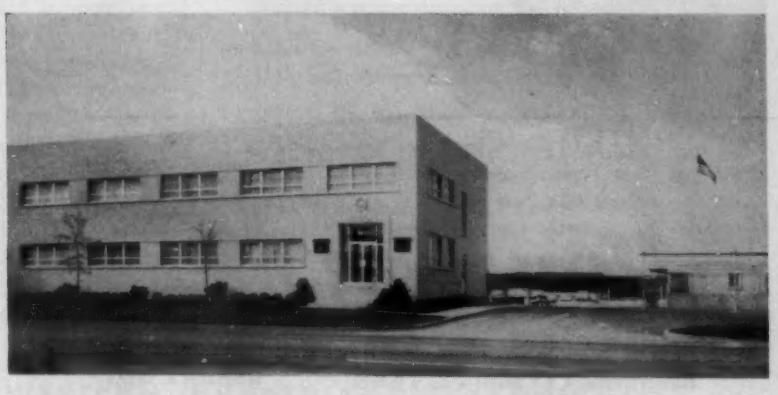
The Detroit-based company must continue to use the cost-of-service type of rate because the FPC says the company's "brief period of actual operations does not yield sufficient experience to justify a change from the prescribed cost of service form of rate schedule to a contract demand rate schedule."

The commission indicated it would be willing to consider the company's request again after it had at least two years of operating experience or could at least show a test period based on 12 months of actual experience.

The minority voters (Commissioners Digby and Stueck) in the 3-to-2 decision dissented on two grounds: (1) "A cost of service rate . . . destroys the free enterprise incentive . . . and may well result in higher rates . . . by the

---

Pipe Line Service Corp. has completed its new general and administrative office located in Franklin Park, Ill. Pipe Line's eight plants—located in the major steel producing areas in the country—will be served from the new office. Site of the building is the company's plant serving the Midwest area.



ultimate consumers; and (2) the fluctuating price paid by distributors which penalizes the utility when the price goes up or the burner-tip user when the price goes down. The distribution company cannot be constantly before a state regulatory commission every billing date."

Cincinnati Gas goes to high court in rate case

Cincinnati (Ohio) Gas & Electric Co. is seeking Supreme Court review of the dismissal by the U. S. Court of Appeals of Cincinnati's petition to review an order issued by the FPC.

The FPC order, issued in June 1956, approved the contract-demand rate form for use by Ohio Fuel Gas Co. in its sales to the Cincinnati company.

Cincinnati stated that under the Mobile-Sierra doctrine, the commission could not change "the length of commitment as to billing demand units" without a finding of adverse effect on the public interest of the terms of the contract, which Cincinnati claims are outside of the scope of the service agreement's language permitting unilateral filing by Ohio Fuel. It also claims that the FPC's finding on that subject was insufficient.

Columbia Gas launches own exploration activities

Columbia Gas System, New York, plans to explore for gas in the southern Louisiana area.

Columbia's oil and gas producing subsidiary, Preston Oil Co., has opened offices in Lafayette, La. from which the exploration and production operations will be directed.

George S. Young, president of Columbia, said that his system will have to obtain substantial additional quantities of gas from presently uncommitted sources to meet 1961 demands. It is becoming increasingly difficult to get purchase contracts for additional volumes of Southwest gas, he said. Accordingly, he continued, "It appears desirable for the system to develop its own reserves and production . . . to assure an adequate gas supply."

Preston Oil will enter into joint arrangements with other producers for drilling exploratory gas wells. And, it will obtain leases on prospective gas lands where it will conduct drilling activities either individually or in partnership with others.

Arizona field boosts El Paso's reserves

If present plans jell, El Paso (Texas) Natural Gas Co. will make Arizona a gas-producing state for the first time.

The transmission company has applied to the FPC for approval of its plan to build facilities to gather, process and deliver approximately 115 MMcf/day from the new Aneth area in southwestern Utah and northeastern Arizona (see GAS Highlights, January, p. 8).

During the past year a number of Arizona gas wells have been completed but were shut-in for lack of pipeline outlet.

El Paso's program will include construction of a natural gasoline plant with a daily capacity of 100 MMcf. Also proposed is a 27,900-hp compressor station with dehydration facilities.

About 79 miles of main trans-

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- Addition of an SIE Computer Controller will provide full compressor station automation.

Ask SIE for complete information on SIEMARC (SIE Monitoring and Remote Control) to learn how immediate installation of the Compressor Start Unit will advance the date of full automation of your pipeline system, and increase station efficiency in the meantime.

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mission line will extend from the Aneth plant to connect with El Paso's 24-in. San Juan mainline near the San Juan River plant in northwestern New Mexico. To collect gas from various new fields in Arizona and Utah, the transmission company will build 87 miles of gathering lines ranging in size from 2 to 30 in.

An El Paso spokesman said the company has signed contracts with a majority of Aneth area producers and will continue negotiations with others in an effort to acquire additional reserves.

Presiding examiner denies FPC staff rate suggestion

Declining to accept the FPC staff recommendation that contract rates were too high, FPC Presiding Examiner Daniel J. Kelly authorized United Gas Pipe Line Co. to buy southern Louisiana gas from two independent producers, Seaboard Oil Co. and Charles B. Wrightsman.

The sales contract provides for an initial price of 19.5 cents/Mcf, including a 1-cent gathering tax. The FPC staff recommended that the certificates should limit the initial price to 18 cents, including gathering tax.

Presiding Examiner Kelly said that the staff offered no reason for the 18-cent price, other than that the 19.5-cent rate was too high. And, that the only basis for this conclusion was a comparison of the initial rate with certain others in southern Louisiana. The examiner said that this presents a question "purely of rate level and nothing else," and that such questions should be decided under Sections 4 and 5 of the Natural Gas Act. He declared that there was no evidence in the case upon which to base a decision that the 19.5-cent rate "is unlawful within the meaning of the provisions of either of these two sections of the Act."

He said the rate has not been shown to be unjustly or unreasonably high or excessive in any rate-making sense, and that—as the staff concedes—the 19.5-cent rate represents the least or lowest price at which United could obtain these reserves.

The decision points out that the FPC has previously held that where the rate involved is not shown to be "necessarily excessive," it may be that "the precise charge that is made initially is less important than the assurance of this great supply of gas," and that under such circumstances a "certificate proceeding under Section 7 of the . . . Act should not assume the character of a rate proceeding under Section 5(a)."

Little Inch conversion draws nearer

Reconversion of the Little Inch line to petroleum products moved a little closer to reality when an FPC examiner concluded hearings on the long drawn-out case.

Months - long consideration of Texas Eastern Transmission Corp.'s plan to convert the line from gas to oil came when attorneys for TET accepted conditions proposed by a group of Mississippi and Ohio barge operators.

The conditions were to the effect that:

1. Texas Eastern should not consider any financial losses it might incur in natural gas operations in arriving at a rate structure for the Little Inch as a common carrier of petroleum products.

2. No new lateral lines connecting the Little Inch with river ports should be built within a 5-year period without approval of the In-

PERRAULT-AMERICAN 25 BBL KETTLE

Agitator mat bars scrape entire kettle bottom every 3.35 seconds, allowing no material to remain on bottom long enough to burn, eliminating coking completely. Mat motion is slow enough so dope is not "whipped." Heavy mat will not float, scrapes bottom thoroughly.

OTHER FEATURES: Actual capacity is 25 bbl.-plus; Completely insulated; Melts dope fast; Drain valve inside kettle requires no pre-heating; Burner gravity-fed, no pump required; Fuel is diesel oil; Fuel tank capacity is 50 gals. Perrault-American 25 bbl. Kettles give contractors the most economical, rapid, maintenance-free-and-easy service. Other sizes available. For more information write or phone.

AND: PATCH POTS, BURNERS AND ACCESSORIES. TONGS, SLING BELTS, AND HOOKS, LINE-UP CLAMPS. HAND TOOLS. SUPPLIES AND EQUIPMENT OF EVERY SORT.

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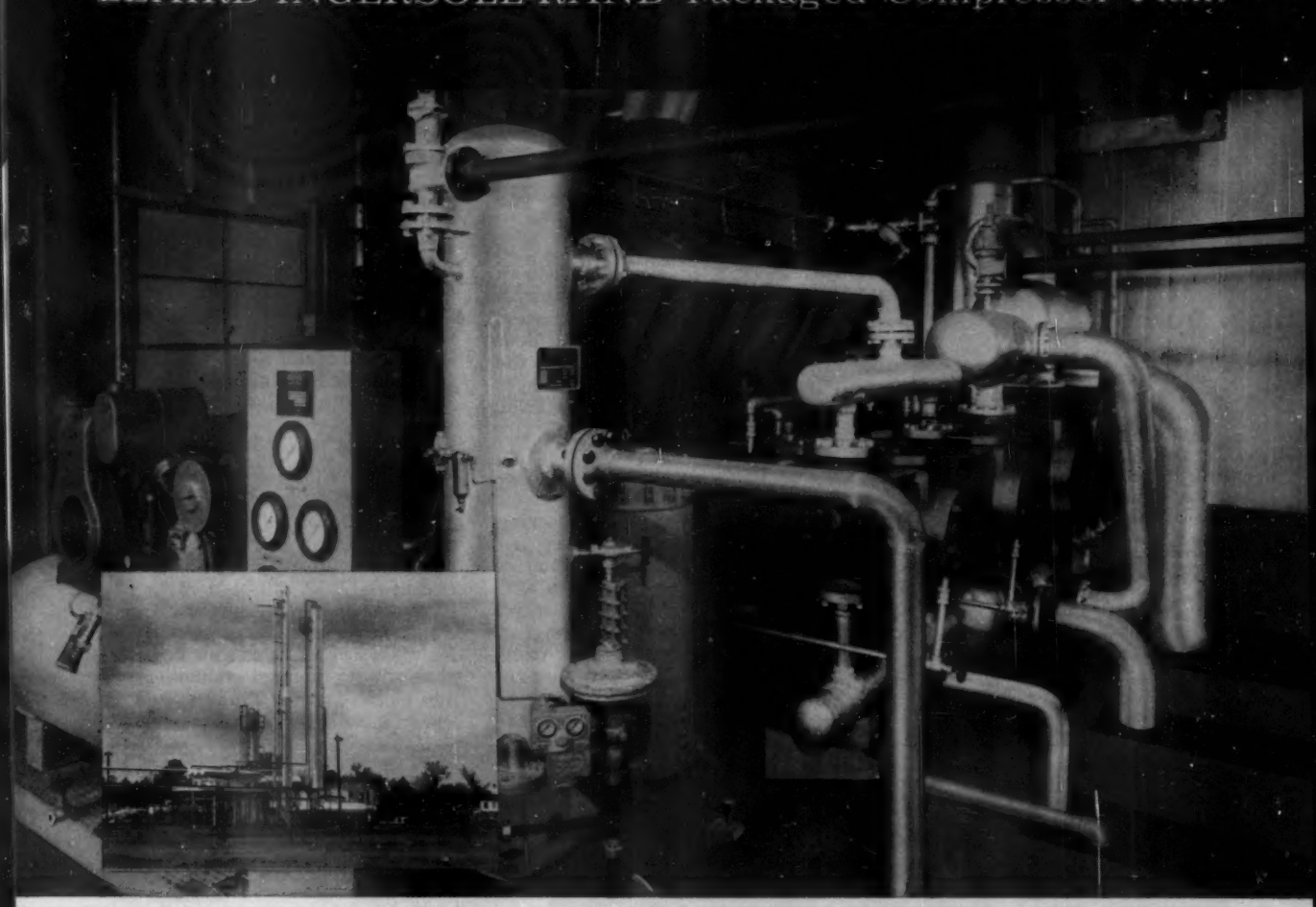

Jones-O'Brien, Inc. North Keatchie Gas Separation facility equipped with a Beaird-Ingersoll-Rand 440 h.p. 8SVG packaged compressor. Unit has radiator with lubricating oil cooler and updraft air turning duct. Semi-automatic operation has been achieved by equipping unit with speed and pressure regulators and shutdown devices. Other sizes from 120 to 660 h.p.

Gas Separation Facility Uses

DUAL PURPOSE PACKAGED COMPRESSORS

another AMF product

PACKAGED COMPRESSOR PLANTS

LOWEST COST PER HORSEPOWER INSTALLED

Jones-O'Brien, Inc. has redesigned its North and South Keatchie gas separation facility to increase efficiency and convert to profits 2,200,000 cubic feet of gas being flared daily.

Both facilities have now been equipped with Beaird-Ingersoll-Rand packaged compressors. At the north facility an 8SVG 440 h.p. unit has been set up to perform a dual task. Two cylinders are compressing propane used as a refrigerant in the extraction process and two cylinders are boosting low pressure gas up to sales line pressure. The unit is set to supply 2.68 mmcfd of 200 psi propane from an input of 10 psi. The other two cylinders will boost 1.1 mmcfd of natural gas from 200 psi to 1,150 psi.

A 330 h.p. Beaird compressor at the South facility is boosting 1.2 mmcfd of natural gas to the sales line. Both units have been designed for semi-automatic operation. Engines are equipped with speed and pressure regulators that permit them to speed up and slow down to maintain a constant suction pressure. Other controls and shutdown devices protect the units from unforeseen changes in operating conditions.

Let us show you how Beaird Packaged Compressor plants will fit into your plant modernizing program.

THE J. B. BEAIRD COMPANY, INC.

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terstate Commerce Commission.

3. The Little Inch should be operated as a common carrier under ICC jurisdiction and with rates fixed at reasonable levels based on a valuation of $110 million on the line.

GAS • Pipeline Notes

Commissioner Frederick Stueck has been reelected vice chairman of the Federal Power Commission for another year. Commissioner Stueck, former chairman of the Missouri PSC, took office as a member of the FPC in July 1954. His term expires in 1959.

New exclusive factory distributors for Plicoflex laminated tapes, Pipeline Coating & Engineering insulating spacers, and Plico asphalt coatings is Corrosion Control Products Co., Long Beach, Calif. Heading the new operation is W. F. McNaughton, who has resigned as vice president and sales manager of Plicoflex Inc. The new organization will cover the Southwest region. V. E. Pinkston is associated with Mr. McNaughton in the new operation.

Leidy and Tamarack storage pools in northern Pennsylvania will be developed by three companies. Seeking FPC approval of the plan (Docket G-13793) are New York State Natural Gas Corp., Texas Eastern Transmission Corp., and Transcontinental Gas Pipe Line Corp. New York State, present owner, will transfer one-fourth interest to each of the two pipeline companies. Transco is in need of storage capacity which would provide 180 MMcf/day service and Texas Eastern expects to need storage capacity within a short time.

Recent FPC actions include:

Granting El Paso (Texas) Natural Gas Co. authority to build $2.4 million gas facilities in Crane county, Texas, and Lea county, N. M. Facilities proposed under Docket G-13252 will be used by El Paso to purchase, process and transport an increase of about 16.5 MMcf/day over and above the presently authorized volumes being received from Phillips Petroleum Co. at Phillips' Crane plant.

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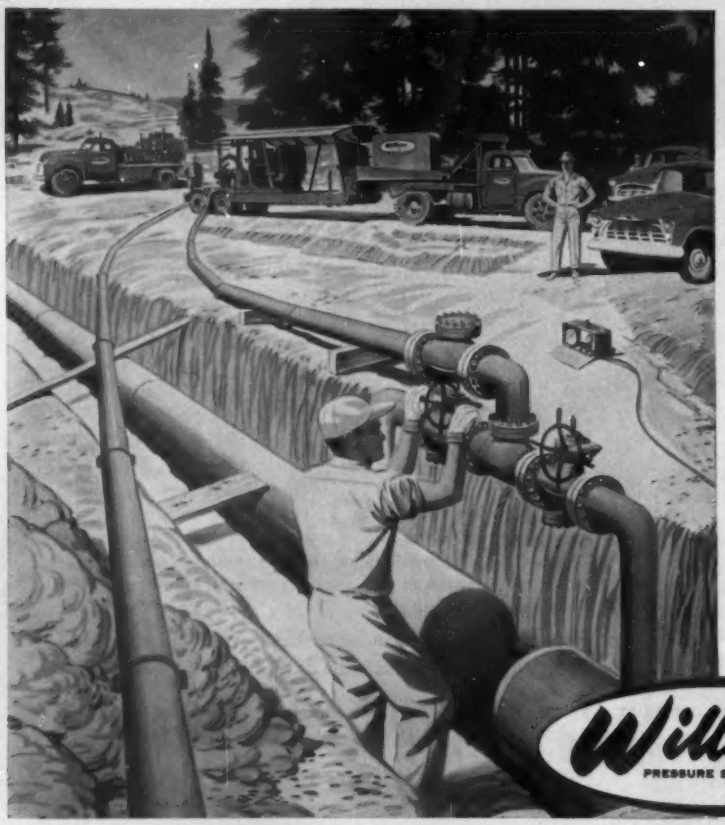

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Also, El Paso will buy and move about 4 MMcf/day from the Cabon Carbon Co. at its King plant.

Accepting applications from Texas Eastern Transmission Corp. and Wilcox Trend Gathering System Inc. Under Dockets G-13391 and 13392, the companies propose spending $4 million for facilities that will enable them to take into their systems natural gas purchased from producers in the general area of their existing transmission systems.

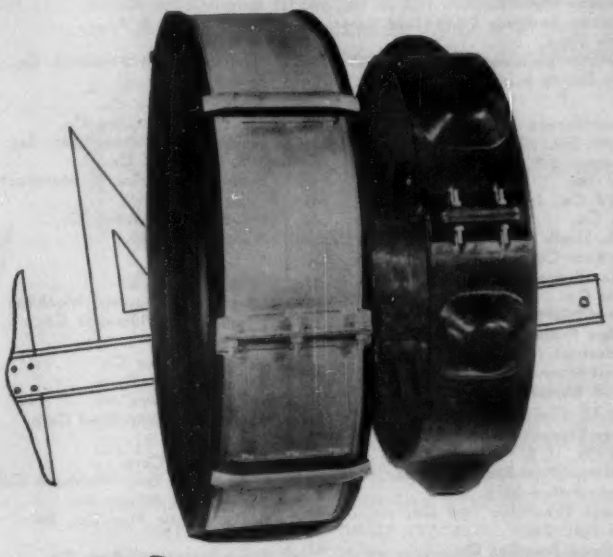
Accepting Cities Service Gas Co.'s application (Docket G-13562) for a 7000-hp compressor station, 6.3 miles of 30-in. and 18 miles of 20-in. line. Construction will take place in Kansas. Cities Service also proposes to abandon some facilities in Texas, Oklahoma, and Kansas. Basic purpose of the plan is to make gas from the Elk City storage fields available to its markets on peak days.

Okayed Texas Gas Transmission Co.'s plan to abandon 30.5 miles of 8-in. line from Martinsville, Ind. to Danville, Ind. (Docket G-11704). Facilities to be abandoned were built in 1947 to enable Texas Gas to deliver gas bought from Panhandle Eastern Pipe Line Co. at a point near Danville. Seventeen farm-tap customers of Indiana Gas & Water Co., now receiving gas from the line, will have this service discontinued.

Directed Michigan Wisconsin Pipe Line Co. to provide an emergency supply of gas to Wisconsin Southern Gas Co. (Docket G-13084). Michigan Wisconsin was ordered to sell gas to Wisconsin Southern not in excess of 2 MMcf/day and not to exceed a total of 200 MMcf during the period from December 1957 to May 31, 1958. The gas will be delivered to Natural Gas Pipeline Co. of America for the account of Wisconsin Southern.

Accepted Permian Basin Pipeline Co.'s application seeking authority to acquire, construct and operate gas facilities in Andrews county, Texas (Docket G-13023). Permian will acquire a 1350-hp compressor unit from Phillips Petroleum Co., operating the unit as an integral part of its system. Permian also plans to turbo-charge six of the 12 units presently operating at Andrews.

"Something From The Irishman"



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Adams Pipe Repair Products 96
Aerotec Corp. ..... —
American Cast Iron Pipe Co. ..... —
American Liquid Gas Corp. 106
American Meter Co. 46, 107
American Radiator & Standard Sanitary Corp. 37
American Recording Chart Co. ..... —
Aqua Survey & Instrument Co. 104

Barber-Greene Co. 14
Barrett Div. Allied Chemical & Dye Corp. ..... —
Baso Inc. 93
Beaird Co., Inc., J. B. 141
Bilco Co. ..... —
Black, Sivalls & Bryson, Inc. ..... Third Cover
Blaw-Knox Co. 110
Bonney Forge & Tool Works ..... —
Bristol Co. ..... —
Bucyrus-Erie Co. 80
Builders Providence Inc., Div. of B-I-F Industries, Inc. ..... —
Burgess-Manning ..... —
Busada Manufacturing Co. ..... —

Carver Stimpson Pipe Cleaning Co. ..... —
Case Co., J. I. 47
Cast Iron Pipe Research Assn. 20, 21
Chaplin-Fulton Mfg. Co. 29
Chicago Pneumatic Tool Co. ..... —
Clark Bros. Co. ..... —
Cleveland Trencher Co. 41
Conkey & Co., H. D., Field Control Div. 67, 68
Connelly, Inc. 92
Cooper-Bessemer Corp. ..... —
Copon Associates ..... —
Coppus Engineering Corp. ..... —
Cosa Corp. ..... —
Crane Co. ..... —

Darling Valve & Manufacturing Co. ..... —
Dearborn Chemical Co. 33, 34
Diebold Inc. 83
Dollinger Corp. 40
Dow Chemical Co. ..... —
Drake & Townsend Inc. ..... —
Dravo Corp. ..... —
Dresser Industries, Inc. ..... —
Clark Bros. Co. ..... —
Dresser Manufacturing Div. 22
Roots-Connersville Blower Div. 109
Southwestern Industrial Electronics Div. 134
Duriron Co., Inc. ..... —

Eastman Chemical Products ..... —
Ebasco Services, Inc. 44
Eclipse Fuel Engineering Co. 25
Edwards Inc., Allan ..... —
E-I-M Co., Inc. ..... —
Electro Rust-Proofing Corp. 88

Field Control Div., H. D. Conkey & Co. 67, 68
Fish Engineering Corp. ..... —
Fish Service Corp. ..... —
Fisher Governor Co. 26, 27
Fisher Research Laboratory, Inc. 97
Foster Co., L. B. ..... —
Foxboro Co. 130, 131

Garrett Oil Tools, Inc. 121
GAS Subscription Order 82
General Controls 16
Goldak Co. ..... —
Goodrich Chemical Co., B. F. ..... —
Grabler Manufacturing Co. ..... —
Grayson Controls Div., Robertshaw-Fulton Controls Co. 5
Greenlee Tool Co. 90
Griffiths Co., E. F. ..... —
Grinnell Co. 24
Grove Valve & Regulator Co. ..... —

Hardwick Stove Co. 43
Hays Manufacturing Co. 95
Heath Survey Consultants Inc. ..... —
Hill, Hubbell & Co. ..... —
Homestead Valve & Manufacturing Co. 35
Houston Contracting Co. 138
Hydrauger Corp. 104

Ingersoll Rand Co. 124, 125
International Business Machines ..... —
International Harvester Co. 30, 31

Jaeger Machine Co. ..... —
Johns-Manville Corp. ..... —
Johnson-Williams, Inc. ..... —
Jones & Laughlin Steel Corp. ..... —

Kaiser Steel Corp. 127
Kitson Valve Div., Welsbach Corp. 90
Koenig Iron Works Inc. 104
Kraloy Plastic Pipe Co., Inc. 81

Lancaster Meter Parts Co. 82
Ledeen Manufacturing Co. 4
L.O.F. Glass Fibers Co. 112
Lone Star Steel Co. 3

Maloney Co., F. H. 143
Manufacturers Engineering & Equipment Corp. ..... —
Mavor-Kelly Co. ..... —
Maxim Silencer Co. ..... —
Maxitrol Co. 84
May Co. ..... —
Mine Safety Appliances Co. ..... —
Minnesota Mining & Mfg. Co. 36
Motorola Communications & Electronics, Inc. ..... —
Mueller Co. 32

National Tank Co. ..... —
National Tube Div., U. S. Steel Corp. ..... —
Natural Gas Odorizing Inc. ..... —
Naugatuck Chemical Div., U. S. Rubber Co. ..... —
Nordberg Manufacturing Co. ..... —
Nordstrom Valve Div., Rockwell Manufacturing Co. ..... —
Norton-McMurray Manufacturing Co. 97
Norwalk Valve Co. 105

Ohio Injector Co. ..... —
Onan & Sons Inc., D. W. 85
Oronite Chemical Co. 9

Parkhill Truck Co ..... —
Parsons Co. 89
Peerless Manufacturing Co. ..... —
Peerless Mfg. Div., Dover Corp. 108
Pennsalt Chemicals Corp., Ind. Div. ..... —
Perfex Plastics Inc. ..... —
Perrault Equipment Co. 140
Philadelphia Gear Works Inc. 7
Pipeline Coating & Engineering Co. ..... —
Pipe Line Service Corp. 133
Pittsburgh Coke & Chemical Co. 136
Pittsburgher Hotel 108
Plicoflex Inc. ..... —
Polyken Products Div., Kendall Co. 18
Protecto-Wrap Co. ..... —

Radiator Specialty Co. 106
Radio Corp. of America ..... —
Reed Manufacturing Co. 91
Reliance Regulator Div., American Meter Co. ..... Second Cover
Republic Steel Corp. ..... —
Reynolds Gas Regulator Co. ..... Front Cover
Ridge Tool Co. 87
River Construction Corp. ..... —
Robertshaw-Fulton Controls Co., Grayson Controls Div. 5
Rockwell Manufacturing Co.
Gas Products Div. 12, 13
Instrument Div. ..... —
Nordstrom Valve Div. ..... —
Roots-Connersville Blower Div., Dresser Industries, Inc. 109
Royal McBee Corp. 45
Royston Laboratories Inc. ..... —

Safety Gas Main Stopper Co. 105
Security Valve Corp. ..... —
Sinclair Oil & Gas Co. ..... —
Skinner Co., M. B. 23
Smith Corp., A. O. ..... —
Smith Manufacturing Co., A. P. 38
Somerville Construction Co. 142
Southern Cross Foresters ..... —
Southern Mill & Manufacturing Co. 106
Southern Pipe & Casing Co. ..... —
Southwestern Industrial Electronics Div. 139
Sprague Meter Co. ..... Fourth Cover
Stafford Co., R. W. 108
Standard Electric Time Co. 39
Standard Magnesium Corp. 48
Standard Pipeprotection, Inc. ..... —
Superior Meter Co. 42

Tapecoat Co. ..... —
Taylor Forge & Pipe Works ..... —
Tennessee Gas Transmission Co. 134
Tex-Tube Inc. 10
Thermac Co. 28
Transcontinental Gas Pipe Line Corp. —
Tulsa Winch Div., Vickers Inc. ..... —

Union Carbide Corp., Union Carbide Chemicals Co. 86
Union Malleable Mfg. Co. ..... —
United Engineers & Constructors ..... —
United Pipe Line Contractors Inc. ..... —
U. S. Pipe & Foundry Co. 1
U. S. Rubber Co., Naugatuck Chemical Div. ..... —
U. S. Steel Corp., National Tube Div. —
Universal Chemicals Corp. 96
Universal Controls Corp. ..... —

Vermeer Manufacturing Co. 92
Vulcan Rubber Products, Inc. 94

Warren Petroleum Corp. 108
Welsbach Corp., Kitson Valve Div. 90
Williams Pressure Service Co. 142
Williamson, Inc., T. D. ..... —
W-K-M Div., ACF Industries 128
Wood Co., John ..... —

Youngstown Sheet & Tube Co. 123

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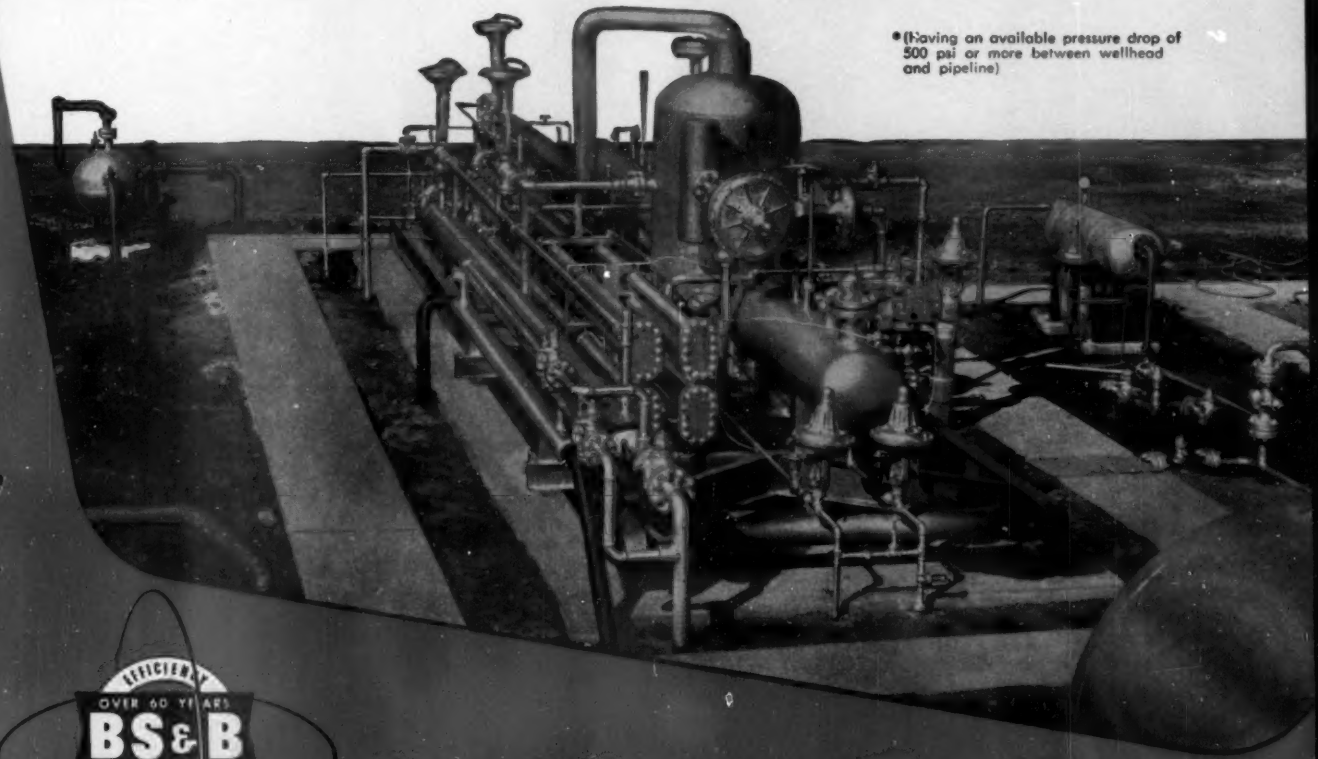

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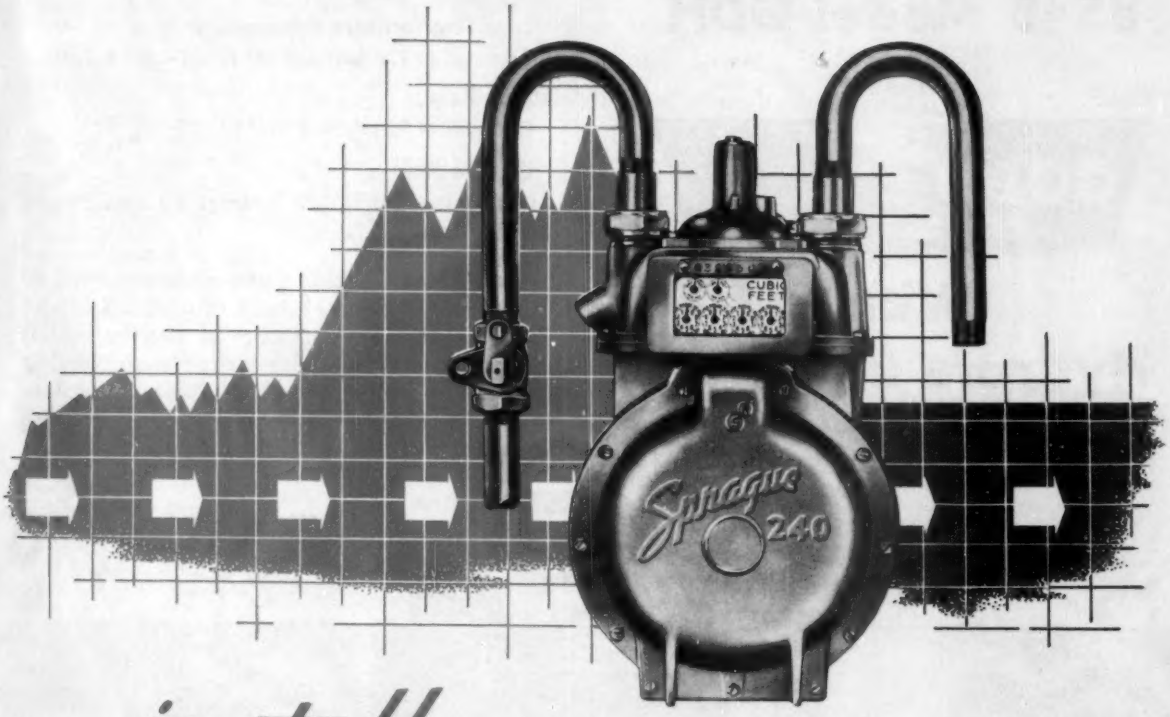

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